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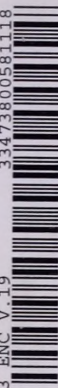


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The Indian Subcontinent

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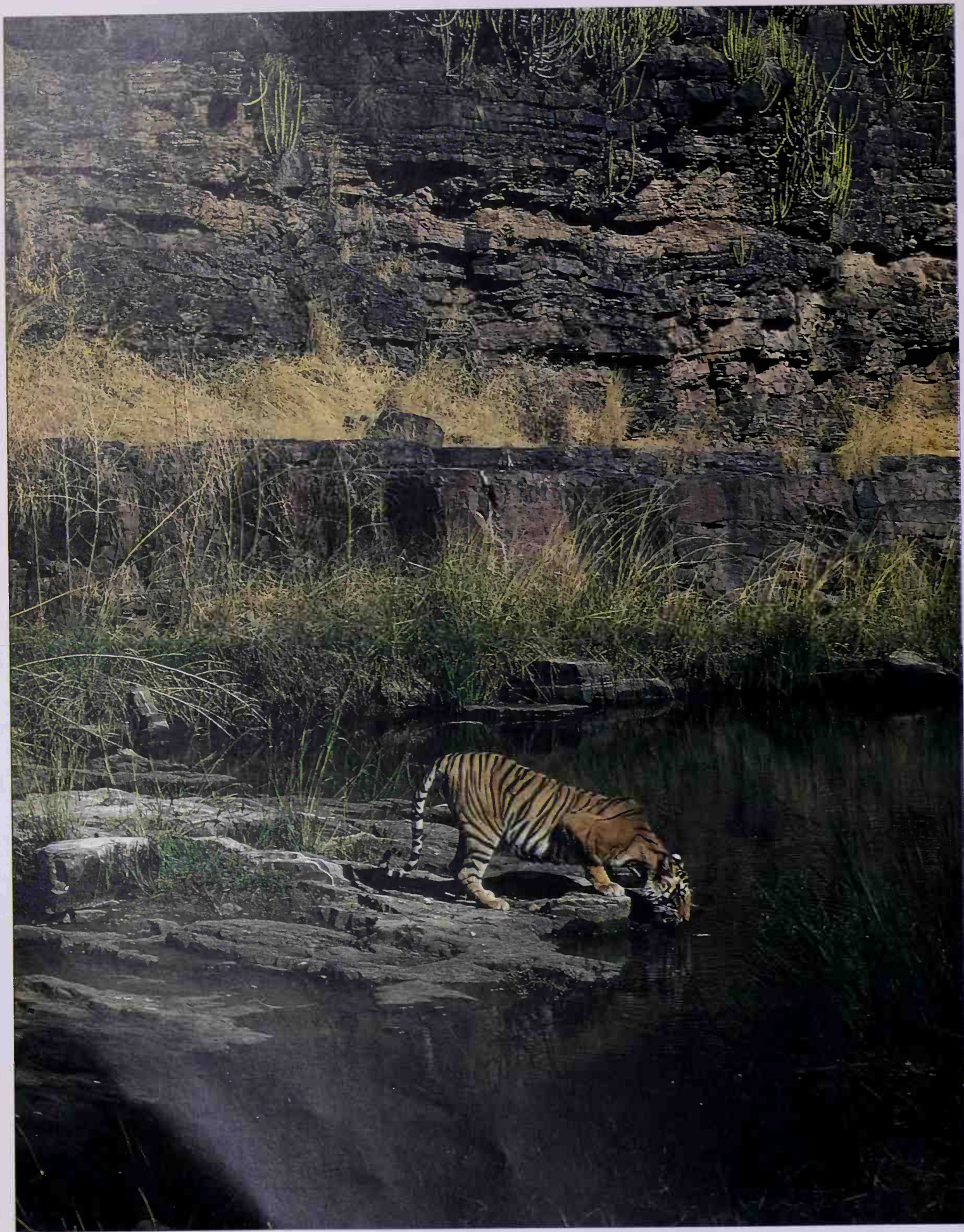
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ENCYCLOPEDIA  
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# ENCYCLOPEDIA OF WORLD GEOGRAPHY




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The Indian Subcontinent

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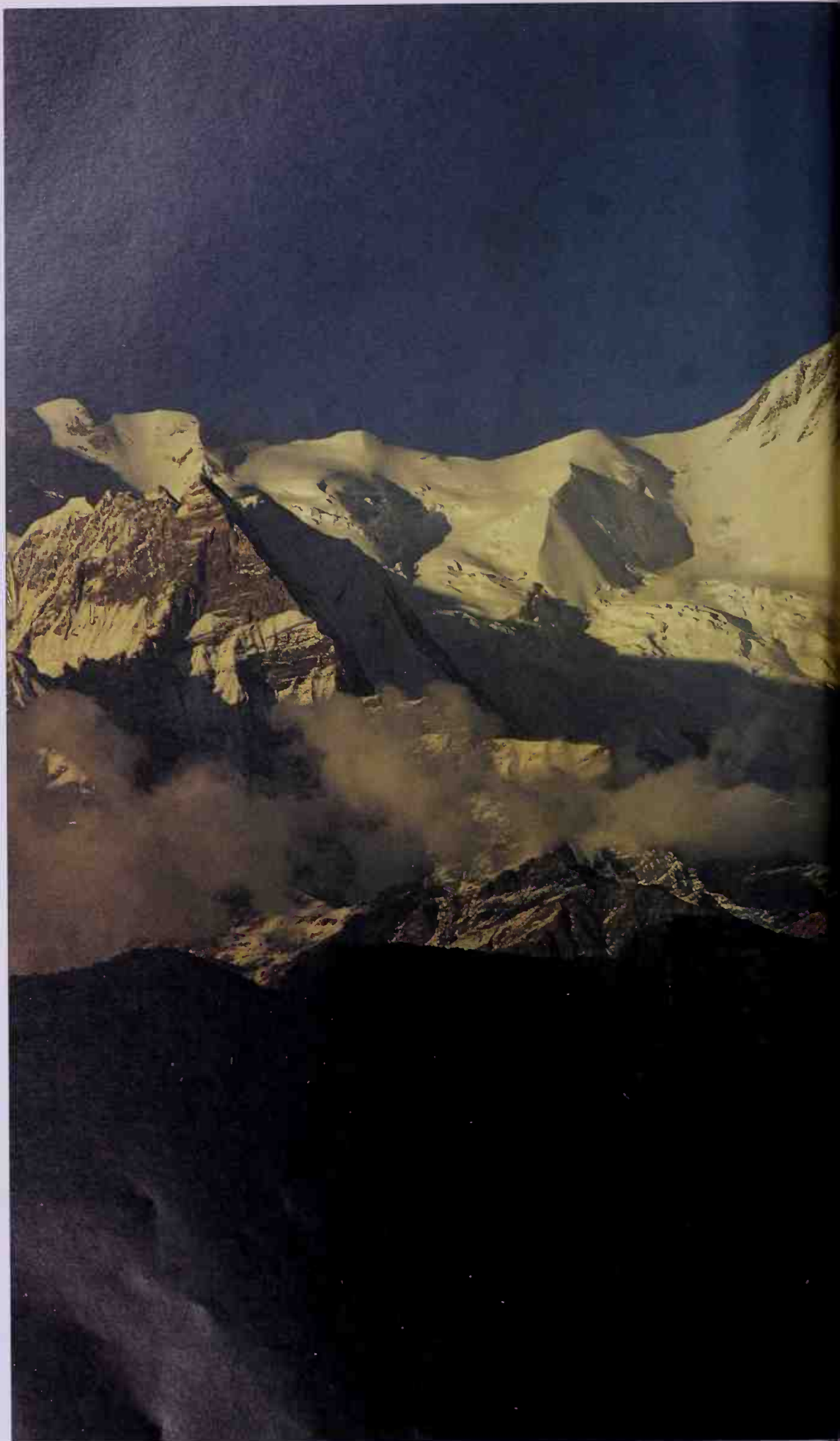
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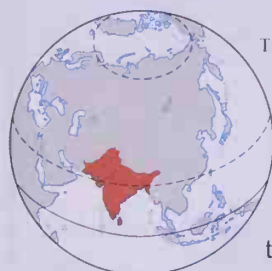
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# INTRODUCTION



The Indian Subcontinent

THE INDIAN SUBCONTINENT WAS SHAPED BY THE mightiest forces of nature. About 40 million years ago the Indian and Eurasian land masses collided with a force that created the great east-west mountain chains of the Himalayas and the Karakoram, containing many of the world's highest mountains including the highest of all, Mount Everest.

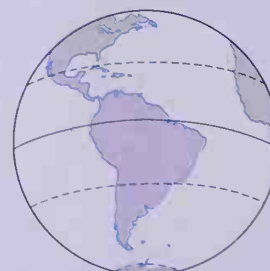
Further volcanic eruptions produced the huge lava flows that formed the peninsula's center and the strings of islands extending across the Indian Ocean. Among them, the coral atolls of the Maldives rise no more than 2m (about 6ft) above sea level and are vulnerable to rising tides.

The region is drained by three of the world's longest rivers which, though rising close to one another, take separate paths to the Indian Ocean. The Ganges and the Brahmaputra meet in Bangladesh in the east of the region, before disgorging their huge sediment load into the Bengal delta, the largest river delta in the world. The Indus flows westward through Pakistan; its shores were home to some of the world's earliest cities. Today, the annual monsoon brings vital water to the countless peasant villages and rice-fields that lie away from major rivers. Climate, physical geography and human impact conspire to create the Thar desert, too dry for farming, and the low-lying lands of Bangladesh where flooding and typhoons can combine to cause disastrous loss of life among peasant cultivators.

The subcontinent has been both a valuable prize for invaders and a hearth of cultural diffusion. Many of the world's major faiths come from northern India, including Hinduism and Buddhism. Among the conquering powers were Muslims who brought Islam, Moguls who created architectural and artistic wonders such as the Taj Mahal, and the British who provided the lingua franca and the railroad. These outsiders added to a cultural diversity that includes nomadic herders of the mountainous fringes and Himalayan uplands, shifting cultivators of the remaining remoter forest regions, and a host of linguistic and ethnic distinctions. India is the world's second most populated country and its sheer cultural diversity sometimes leads to open conflict and secessionism. Even Nepal and Bhutan, two of the world's least-known societies, have begun to experience political unrest.

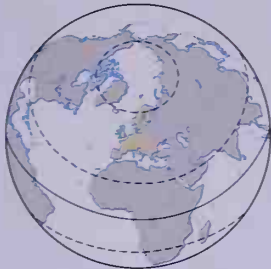


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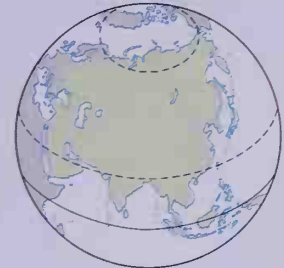
Central and South America



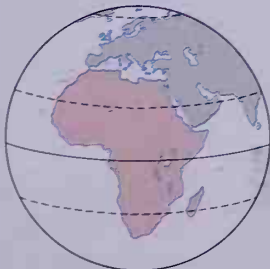


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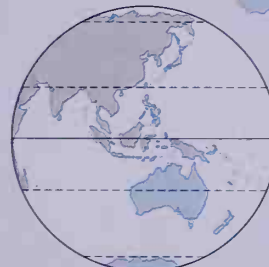
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AU	AUSTRIA	M	MACEDONIA
AZ	AZERBAIJAN	NETH	NETHERLANDS
BEL	BELGIUM	R	RUSSIA
B	BOSNIA AND HERCEGOVINA	RW	RWANDA
BU	BURUNDI	SL	SLOVAKIA
CR	CROATIA	S	SLOVENIA
CZ	CZECH REPUBLIC	SW	SWITZERLAND
DEN	DENMARK	T	TOGO
DOM	DOMINICAN REPUBLIC	UAE	UNITED ARAB EMIRATES
EQ	EQUATORIAL GUINEA	YU	YUGOSLAVIA
HUN	HUNGARY		



Asia

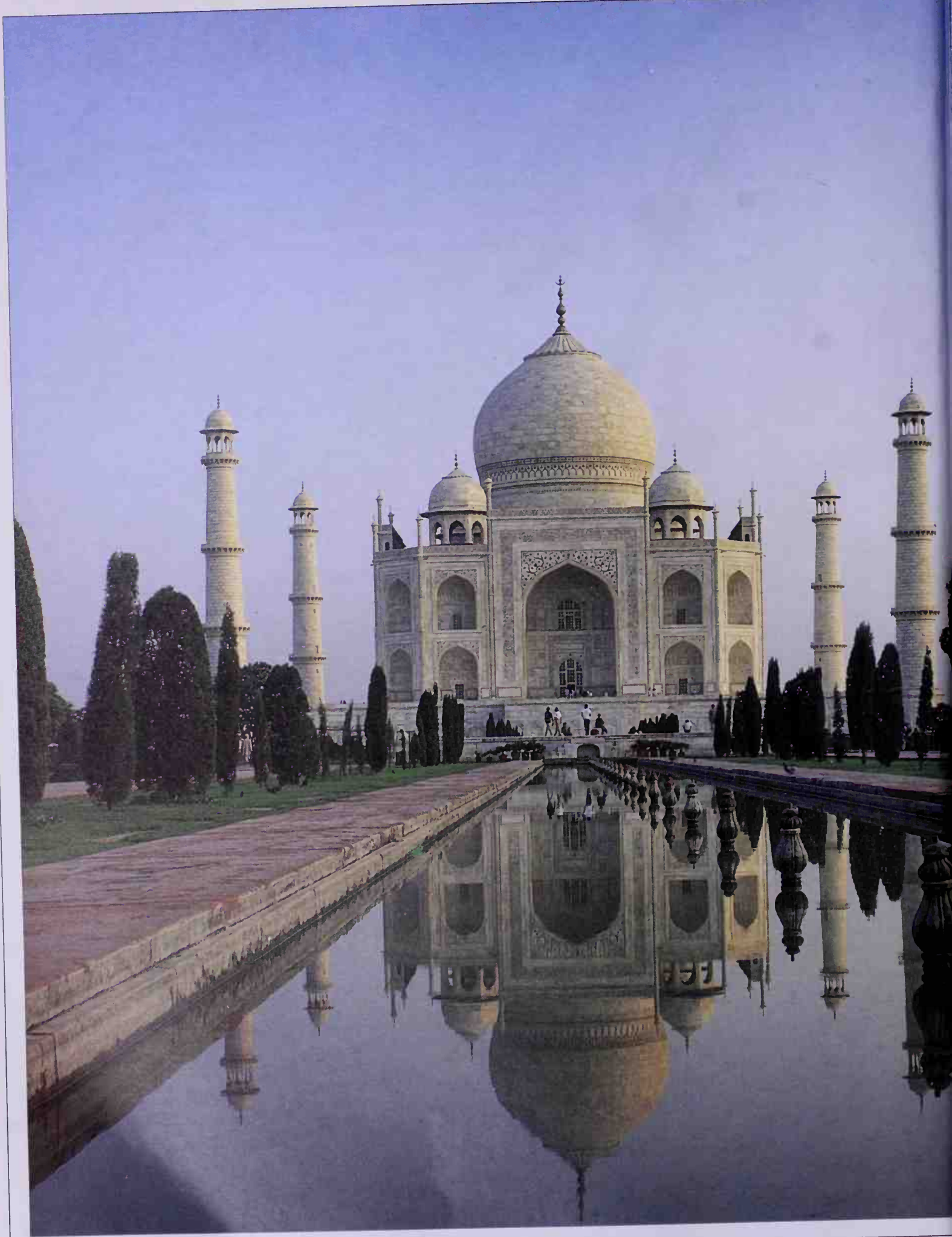


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Antarctica





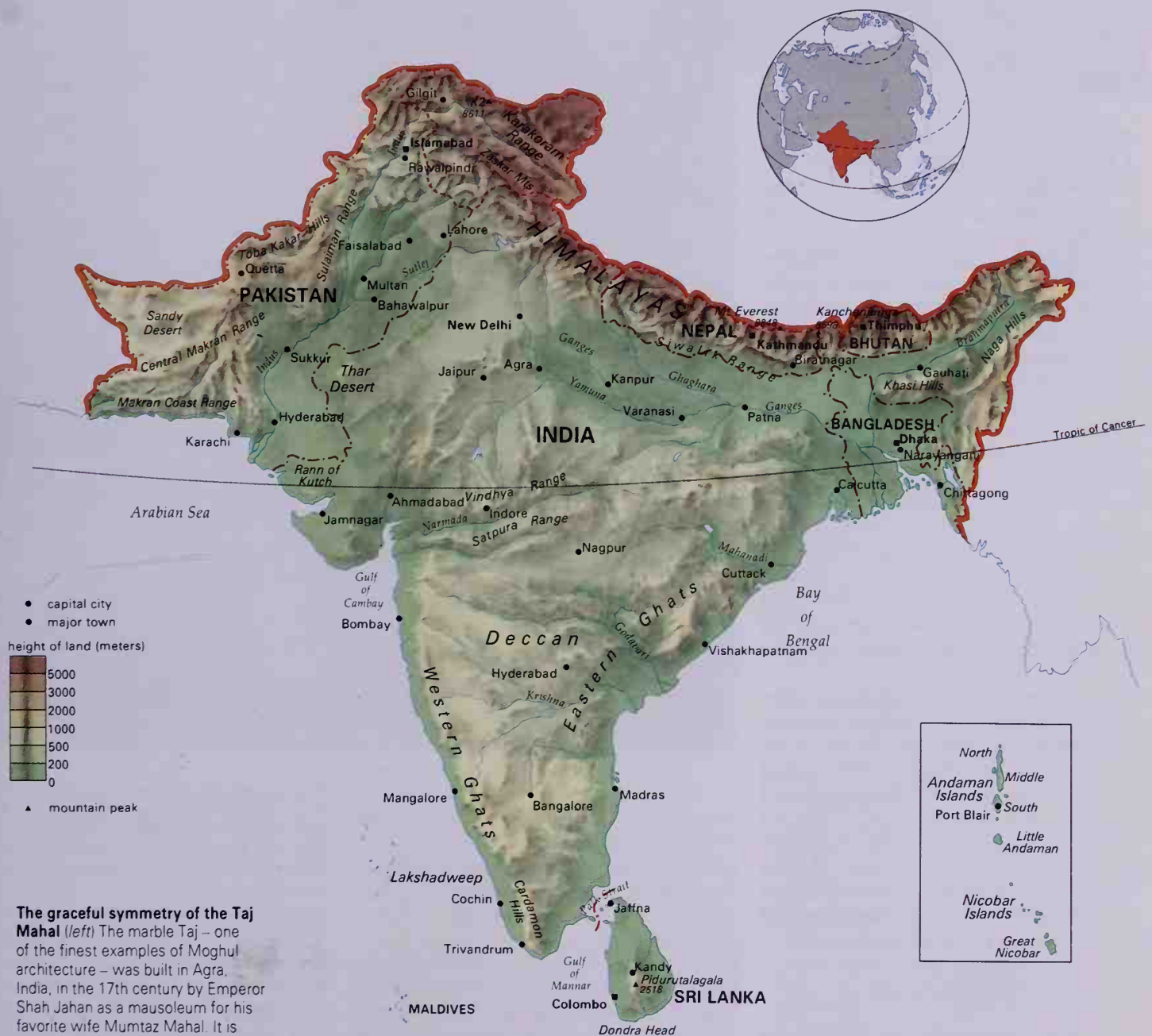
# The Indian Subcontinent

COUNTRIES IN THE REGION

INDIA · BHUTAN · PAKISTAN · NEPAL  
BANGLADESH · MALDIVES · SRI LANKA

DEPENDENCIES IN THE REGION

BRITISH INDIAN OCEAN TERRITORY



**The graceful symmetry of the Taj Mahal** (left) The marble Taj – one of the finest examples of Moghul architecture – was built in Agra, India, in the 17th century by Emperor Shah Jahan as a mausoleum for his favorite wife Mumtaz Mahal. It is just one of thousands of splendid monuments reflecting India's rich cultural heritage.



# India

REPUBLIC OF INDIA



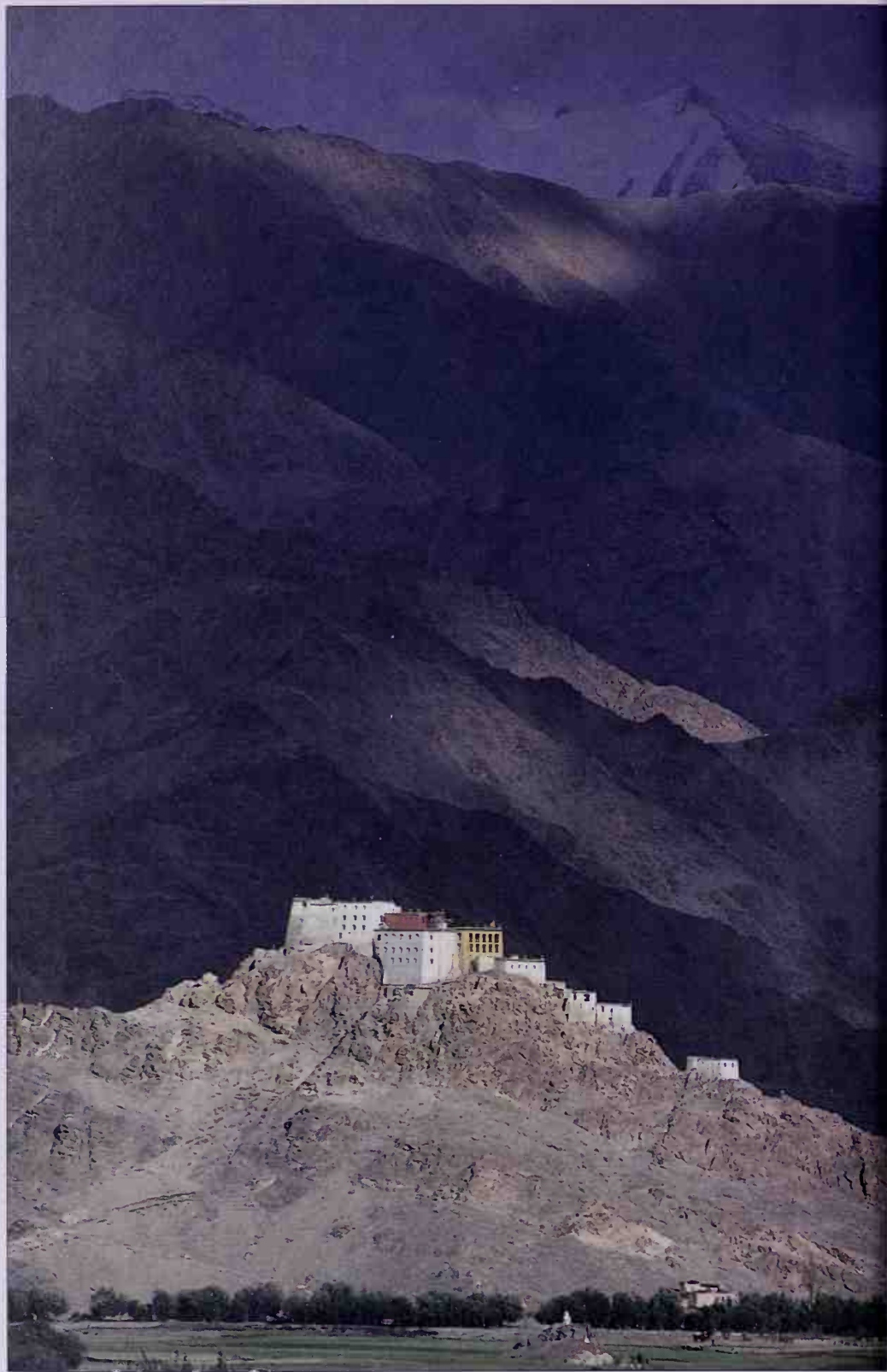
THE INDIAN SUBCONTINENT, A LARGE PENINSULA in southern Asia, covers an area about one-third the size of Europe. To the north the massive mountain ranges of the Himalayas form a barrier to the rest of Asia. To the west India is bounded by the Arabian Sea; the Indian Ocean is to the south and the Bay of Bengal to the east.

India boasts one of the world's oldest civilizations (the Aryans), whose history has been recorded as far back as the 15th century BC. In the 3,500 years since then the diverse and often divided population has grown rapidly. The many communities of the Indian subcontinent found a common goal in the 19th and 20th centuries as they sought independence from Britain. Independence brought with it the partitioning of the subcontinent, and the creation of the state of Pakistan, as well as much religious and political unrest. Today within its new boundaries India has preserved a fragile unity.

The modern republic of India occupies the greater part of the Indian subcontinent, bordering Pakistan to the west, Tibet (now occupied by China), Nepal and Bhutan to the north, Bangladesh and Burma to the east. Control of the far northwestern state of Jammu and Kashmir is disputed with Pakistan. Indian island territories include Lakshadweep in the Arabian Sea, and the Andaman and Nicobar Islands in the Bay of Bengal.

## ENVIRONMENT

The varied landscapes of India are a prime example of plate tectonics (the movements of continental land masses).



It is now generally accepted that the Himalayas – the highest mountains in the world – and the great trench to the south of them were created by the collision of two ancient continental “plates”.

### The land

The towering ranges of the Himalayas descend southward to a fertile alluvial plain that crosses the country in a broad band from east to west. The southern part of the country consists of the triangular peninsula of the Deccan, which contains

**Dwarfed by the mountains of Ladakh**, part of the mighty Himalayan chain that extends across northern India, Thikse monastery perches on a barren hill. The high fertile plains and deep mountain valleys of Ladakh provide some of the most dramatic scenery in India.

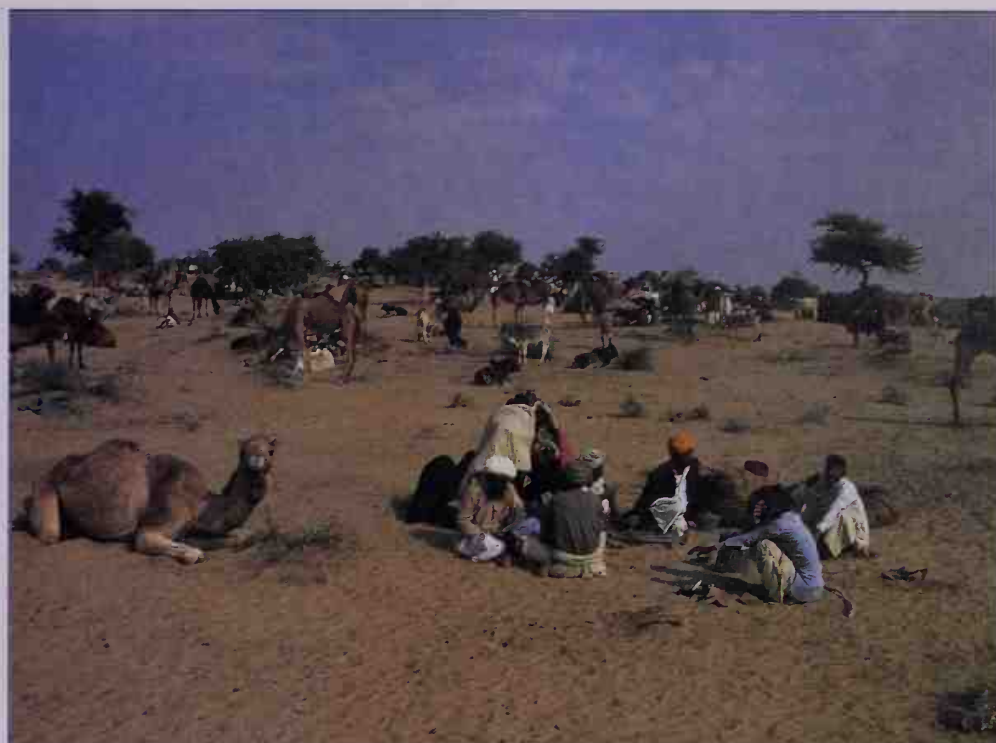
some of the world's oldest rocks.

Geologists divide the Himalayas into five main bands, the most northerly being the Indus-Tsangpo Furrow, which runs across northern Kashmir and deep into neighboring Tibet. It is the source of the great Indus and Brahmaputra rivers. Farther south lie the Greater Himalayas,

whose massive peaks straddle the Tibetan border from Kashmir in the northwest to the northeastern corner of India. Because they are so high, these mountains are permanently covered in snow and ice. Here the glaciers are among the biggest in the world, and their meltwaters are the source of many southward-flowing rivers. Still farther south a range of deeply dissected spurs separates the Greater and Lesser Himalayas. These in turn give way to the lower sandstone ranges of the Siwalik Hills, fringing India's northern plains.

Some of the world's most fertile farmland is found on the heavily populated north Indian plains. These were formed from a trench, originally up to 2,000 m (6,500 ft) deep, that is now largely filled by stones and alluvium washed downstream from the mountains by rivers. Of the main rivers, the Indus runs southwest into Pakistan, while the Ganges flows southeast along the plains toward the Bay of Bengal. India's other great river, the Brahmaputra, flows southwest through the northeastern state of Assam to meet the Ganges, creating a massive delta in Bangladesh and West Bengal. The plains of Assam are enclosed by mountains to the southeast.

South of the plains, beyond the ridge of the Vindhya Mountains lies the massive



Deccan plateau comprising Maharashtra state and parts of Madhya Pradesh, Andhra Pradesh, Mysore and Orissa. This ancient, heavily weathered terrain was thought to be geologically stable until an earthquake occurred there in 1967. On the western side, the mountains of the Western Ghats rise sharply above a narrow coastal plain; beyond them the plateau slopes away gently eastward to

**A caravan at rest in the Thar Desert**, northwestern India, the eastern extension of the world's largest arid region that encompasses the Sahara and the Arabian desert. Covering some 259,000 sq km (100,000 sq mi), the Thar is home to nomadic cattle herders.

## Lakshadweep – land of the giants

Some 300 km (200 mi) off the Malabar coast of southwestern India are the Lakshadweep, the "hundred thousand islands" (also known as the Laccadives). In fact there are only 14 islands, of which 10 are inhabited, the rest of the chain comprising coral reefs. The islands do have a mystery though.

A meter or so (a few feet) beneath the light coral sand there should be a layer of coral some 40 cm (16 in) thick, and yet on all the main islands this coral stratum, at some point in the remote past, was completely dug away. This was a massive task for an area measuring as much as 30 sq km (12 sq mi). As a result, the underlying sands were exposed, creating the ideal growing medium for crops. Local tradition says that the excavation work was done by giants; the truth may never be known.

The people of Lakshadweep are Moplahs, of mixed Indian and Arab descent who are Muslims but speak the Malayalam language of neighboring southwest India. From 1498 the islands were in Portuguese hands, but the Moplahs shook off their rule in 1545 and gave their allegiance to the raja of Cannanore on the Malabar coast. After 1792 the southern group of islands won self-government in return for paying tribute. However all the islands were sequestered by the British in 1877, and came under Indian control following the withdrawal of the British in 1947. In 1956 they were designated an Indian "union territory".

The islanders are very skilled boat-builders and sailors. Only local craft make the dangerous journey through the encircling reefs to the Indian mainland. Fishing is the chief occupation, and grain, pulses, bananas, vegetables and coconut palms are farmed. The Moplah women make coir from the fibers of coconut husks.

### NATIONAL DATA

<b>Land area</b>	3,166,414 sq km (1,222,559 sq mi)				
<b>Climate</b>	<b>Altitude</b> m (ft)	<b>Temperatures</b>		<b>Annual</b>	
		<b>January</b> °C (°F)	<b>July</b> °C (°F)	<b>precipitation</b> mm (in)	
New Delhi	216 (708)	14 (57)	32 (90)	715 (28.2)	
Cherrapunji (near Shillong)	1,313 (4,309)	12 (54)	20 (68)	26,470 (1,042)	
Madras	16 (51)	24 (76)	31 (87)	1,270 (50.0)	
<b>Major physical features</b> highest point: Kanchenjunga 8,598 m (28,208 ft); longest rivers: Brahmaputra (part) 2,900 km (1,800 mi); Ganges 2,506 km (1,557 mi)					
<b>Population</b> (1990) 853,094,000					
<b>Form of government</b> federal multiparty republic with two legislative houses					
<b>Armed forces</b> army 1,100,500; navy 54,400; air force 110,100					
<b>Largest cities</b> Calcutta (9,194,000); Bombay (8,243,000); New Delhi (capital – 5,729,000); Madras (4,289,000); Bangalore (2,922,000); Ahmadabad (2,548,000); Hyderabad (2,546,000)					
<b>Official languages</b> Hindi, English					
<b>Ethnic composition</b> Hindi 38.8%; Telugu 8.0%; Bengali 7.6%; Marathi 7.3%; Tamil 6.6%; Urdu 5.2%; Gujarati 4.9%; Kannada 3.9%; Malayalam 3.8%; Oriya 3.4%; Punjabi 2.7%; Assamese 1.6%; others 6.2%					
<b>Official religion</b> none					
<b>Religious affiliations</b> Hindu 82.6%; Muslim 11.4%; Christian 2.4%; Sikh 2.0%; Buddhist 0.7%; Jain 0.5%; others 0.4%					
<b>Currency</b> 1 Indian rupee (Re, plural Rs) = 100 paise					
<b>Gross national product</b> (1989) US \$287,383 million					
<b>Gross domestic product</b> (per person 1990) US \$1,150					
<b>Life expectancy at birth</b> male 60.0 yr; female 58.0 yr					
<b>Major resources</b> agriculture/fisheries 32.6% GNP; mining 2.3% GNP; manufacturing 18.0% GNP; trade/tourism 12.5% GNP					



the more broken ranges of the Eastern Ghats above a broader coastal plain. The Eastern and Western Ghats converge in the south to form the Nilgiri Hills near the farthest tip of the peninsula.

### Climate

Although India generally has a tropical monsoon climate with marked seasonal changes, there are considerable local variations across the country.

From December to March, cold winds blowing southward out of the Himalayas produce cool, dry winter conditions in all regions except the far south and west, which remain hot and humid. In the north the nights are cool and sometimes frosty, but daytime temperatures are pleasantly warm.

Spring, in April and May, brings a change in the prevailing winds, drawing in warmer air from the south. Most of India has little or no rain during this, the hottest time of the year. The intense heat becomes uncomfortable, particularly in the center of the country, so that the summer monsoon rains come as a welcome relief bringing temperatures down again.

The timing of the rainy season (usually from June to September) is varied and unpredictable, as is the amount of rain that falls. Most of India receives at least some rain, but if the monsoon fails as it occasionally does, drought and famine are the result. The Thar Desert in the west bordering southern Pakistan has little if any rain. The highest rainfall levels are recorded in the northeast and along the southwest coast.

In October and November the winds turn once again. However this is a slow process, and the meeting of northern and southern airflows can produce violent tropical cyclones, especially around the Bay of Bengal.

### Plants

At one time much of the Indian subcontinent was dense forest, but today less than one-fifth of India is forested.

Most river deltas have mangrove forests along their seaward edges. The Sundarbans, at the mouth of the Ganges, is one of the world's largest mangrove swamps, covering 4,000 sq km (1,540 sq mi). Dry tropical forest is found on higher ground with low rainfall; rosewood, ironwood and teak grow in the southwest and sal (termite-resistant hardwood) in the northeast. Assam in the northeast and the Western Ghats along the southwest coast have moist tropical rainforest; many commercial crops – coconuts, betel nuts,



**Floodwater from the river Ganges** (above) during the monsoon season obliterates farmland around Patna in Bihar State, eastern India, which receives so much rain that irrigation is unnecessary. An inundation such as this can devastate crops on the low-lying plain.

**Lush stands of palm trees** (below) overhang one of the many placid backwaters – the usual transportation routes for farmers – in Kerala State in the far southwest of India. Kerala has long been famous for its spices, including cloves, ginger and pepper.



pepper, ginger, rubber and bananas – are grown here. To the south the Nilgiri and Palni Hills are covered in subtropical and temperate woodland.

In the wetter eastern Himalayas, evergreen oak and chestnut predominate, and on higher ground rhododendrons. This is one of the richest areas of plant life in the world, with some 4,000 species. To the





west there are three bands of vegetation. Subtropical pines and sal are characteristic of the foothills, while at higher altitudes there is temperate woodland, and higher still, alpine vegetation, including silver fir, birch and junipers. Little grows in the western Thar Desert apart from drought-resistant bushes and endemic species such as the horseradish tree.

### Wildlife

India has a remarkably rich variety of wildlife. But as forests are reduced, and more land is turned over to agriculture, animal habitats are destroyed. The Indian rhinoceros, Asian elephant and other endangered species are now protected in nature reserves. Protected animals include the gaur (a kind of wild ox), the Asiatic lion, tigers, Snow leopards, macaque monkeys, Musk deer, the Great Indian Bustard and the gharial, a large crocodile pushed to the edge of extinction. There are also bears, monkeys and some 1,400 species of birds, including peacocks. India is also home to an enormous variety of reptiles, including many kinds of snakes. Among the venomous snakes are the King cobra (the world's longest poisonous snake), 11 species of krait and more than 20 viper species. Harmful insects include mosquitoes, and locust swarms that can devastate crops. Other insects are bees, silkworm moths and butterflies.

## The Andaman and Nicobar Islands

Positioned on a main trading route between India and Southeast Asia, the Andaman and Nicobar Islands have been known to travelers from the earliest times. The Greek astronomer Ptolemy (flourished 127–145 AD), called them Agathou Daimonos Nesos, or the "Good Spirit Islands", but most other visitors down the centuries spoke of the hostility they encountered there, prompting the nickname "the savage islands".

There are 204 islands in the Andaman group and 19 in the Nicobar group, all lying in the Bay of Bengal some 650 km (400 mi) west of the coast of southern Burma. The Andamans are dominated by Great Andaman, three of the largest islands clustered together; the largest of the Nicobar group is the most southerly island known as Great Nicobar. The two island groups are separated by the Ten Degree Channel, approximately 145 km (90 mi) wide.

The Andamanese were originally hunter-gatherers, a Negrito people who never learned the use of fire. Their only weapon was the bow and arrow, and any foreigner who set foot on their territory was killed on sight. The people of Nicobar were probably of mixed Southeast Asian origin, but equally unfriendly to strangers.

No Europeans attempted to settle the area until 1789, when a British captain tried to establish a penal colony on the Andaman Islands. The venture failed,



**Hindu gods**, flowers and other offerings adorn a sacred tree on one of the Andaman Islands in the Bay of Bengal. Although a few of the aboriginal Andamanese have kept their traditional beliefs, most of the islanders are Hindus.

but in 1855, after the islanders had made several attacks on shipwrecked crews, a new settlement and convict establishment were successfully established there. In 1869 another penal settlement was created in the Nicobar Islands, but was withdrawn in 1888.

During World War II both island groups were occupied by the Japanese from 1942 until the Allies recaptured them in 1945. When India won its independence two years later, the islands became a union territory of the new republic. Today they are administered from New Delhi through a lieutenant-governor, who is advised by a five-member local council.

### SOCIETY

The long and eventful history of the Indian subcontinent has left a rich legacy of art, literature, architecture (including temples, shrines and palaces) and music. It has also left a very divided society. The gap between rich and poor throughout the subcontinent is very marked, and the caste system often makes it impossible for the least prosperous to improve their situation. Religious conflicts dating back for centuries still play their part in modern politics, sometimes leading to outbreaks of violence that can even threaten civil war.

### History

There have been human settlements in the Indian subcontinent for at least 200,000 years. However, the first trace of a major civilization – in the Indus valley – dates back to 2500 BC. Archeological evidence suggests that many Hindu beliefs and customs derive from this Indus culture, which survived for almost a thousand years.

The Indus civilization was probably ousted by an invasion of Aryan peoples from the Iranian plateau. The legendary history of this new civilization is preserved in their religious literature – the *Vedas* – and also in two great epic poems: the



*Ramayana* and the *Mahabharata*. The invaders built towns and cities along the Ganges plains, spreading their culture and their Sanskrit language far and wide. Their concept of social classes, or castes, and the religious ideas expressed in their philosophical writings (the *Upanishads*), were fundamental to the development of later Indian societies. By about 1000 BC the Aryan civilization covered most of northern India, and was beginning to expand southward.

Two new religious movements arose in the 6th century BC. Vardhamana the Mahavira (died c. 468 BC) was the founder of Jainism, which still claims many adherents among India's merchant community. At about the same time prince Gautama Siddhartha, the Buddha (c. 563–483 BC) began a religious movement that was later to spread across much of southern and eastern Asia.

During the following century the various kingdoms in the subcontinent fought for supremacy, until the great Kingdom of Magadha, south of the lower Ganges, triumphed. In the 4th century BC Chandragupta Maurya (reigned c. 321–297 BC) seized the throne of Magadha, expanding his power base west of the Indus and south into the Deccan plateau. Under his grandson Ashoka (reigned c. 265–238 BC) the Mauryan empire grew till it dominated the subcontinent. After his death it began to fragment into smaller kingdoms, and later northwestern India came under the sway of Indo-Greek rulers from Bactria (now Afghanistan).

India's trade with the West and with China developed in the 1st century AD,



**The great cave-temple complex at Ellora**, in the northwest of the Deccan, central India, has some of India's finest archeological treasures, including many vigorous figure-sculptures. The 35 temples of the Buddhist, Hindu and Jain religions were built between the 6th and 9th centuries AD.



and some colonies were founded in Southeast Asia. Three centuries later the Gupta dynasty, based at Magadha, reunited much of northern India, heralding a "Golden Age" of Hindu civilization. However, Hunnish invasions in the 5th century caused its collapse. This was followed by the emergence of two powerful states: in the north Harsha (c. 590–647), a warrior king, sought to extend his power into the south, where the Calukya dynasty ruled. But both these empires were short-lived. In 712 Sind, in the northwest, was occupied by Arab Muslim invaders from the west.

It was not until the year 1001, however, that the Muslims, led by a Turkish sultan, Mahmud (971–1030) of Ghazna (now in Afghanistan), carried the banner of the Prophet eastward into the Punjab and beyond. By the 12th century, power struggles developing among the Muslims at home were spilling over into India. A people called the Ghurids (also from present-day Afghanistan) captured what remained of Mahmud's Indian empire, and built their own empire, which later became the powerful Sultanate of Delhi. Sultan Muhammad ibn Tughluq (c. 1290–1351) ruled over the greater part of the





**An Indian miniature** (above) of Emperor Akbar (1542–1605) receiving a gift from a loyal subject. Akbar was the greatest of India's Mughal emperors, extending his empire across northern India. He was a patron of the arts, famed for the firmness and wisdom of his rule.

**Sunlight burnishes the gilded facade** (left) of the Golden Temple at Amritsar, about 380 km (236 mi) northwest of Delhi. The temple, the Sikhs' holiest shrine, was built soon after the founding of the city in 1577, and sits on an island in a vast sacred pool.

**The British cavalry** (below) battles with Indian mutineers outside Lucknow in 1858. The Indian Mutiny was triggered by rumors that new rifle cartridges issued to Indian troops were greased with cow and pig fat, abhorrent to Hindus and Muslims respectively.

subcontinent, but his attempts to secure the south led to a series of rebellions and to the establishment of two breakaway states in the Deccan: the Hindu Kingdom of Vijayanagar and the Muslim-ruled Bahmani sultanate. A Mongol invasion from the northwest in 1398 greatly reduced the power of the Delhi sultanate, but it survived into the 16th century.

The 14th century saw the foundation of the Sikh religion. It began partly as an attempt to reconcile the warring claims of Islam and Hinduism. From 1519 Babur "the lion" (1483–1530), a Muslim adventurer of Mongol extraction, began to raid India. He crushed what was left of the Delhi sultanate, and in 1526 founded the Mughal empire. His grandson Akbar (1542–1605) consolidated the empire, extending it throughout most of northern India and part of the Deccan.

Earlier, in 1498, the Portuguese navigator Vasco da Gama (c. 1460–1524) had reached Malabar on India's western coast. The Portuguese quickly established trading posts and bases, which they maintained with their considerable naval power. Portugal retained an effective monopoly on trade with India until the 17th century, when the Dutch, English and French East India Companies set up trading stations of their own.

Under Aurangzeb (ruled 1659–1707), the Mughal empire reached its greatest extent. But Aurangzeb ruled with a heavy hand, and after his death the empire began to crumble in the face of the Hindu

Maratha rebellion in central-western India. The British and French East India Companies exploited the weakening of Mughal power to seize territory and between 1744 and 1760 they fought each other for dominance in India. The victorious British then began a piecemeal conquest of India, taking full advantage of the bitter rivalries that divided India's princely states. By 1799 the British East India Company had become the dominant power in India, and by 1849 virtually the whole of the subcontinent was under British control.

In 1857 discontent with British rule culminated in a military uprising among Indian soldiers. The rebellion, known as the Indian Mutiny, soon gained the support of peasants, landlords and princes, but it remained confined to northern India. The Sikhs stayed loyal to Britain, and there was little fighting in the south. It took the British 14 months to crush the rebellion, after which – in 1858 – they transferred the whole of British power in India from the East India Company to the British Crown. But they allowed states with Indian rulers to retain a degree of autonomy.

India was now part of the British empire and called the "jewel in the crown". In 1876 Queen Victoria was proclaimed Empress of India. But the superior attitudes of British officialdom encouraged a growing nationalist movement. In 1885 the Indian National Congress was created, the first political



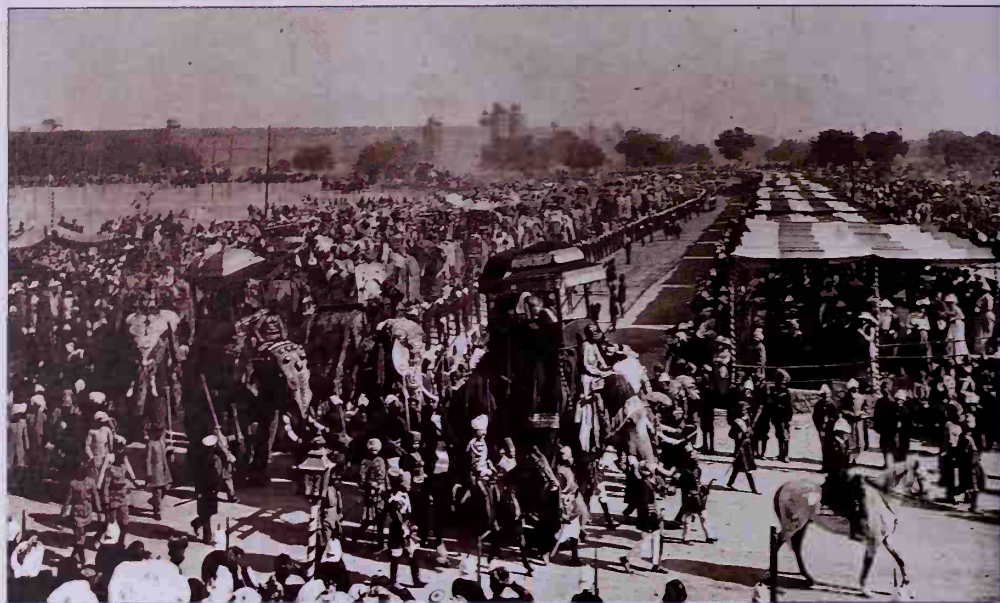


**A grand procession of elephants** follows the British Viceroy, Lord Curzon, into Delhi during the 1903 Delhi Durbar (or reception). The event highlighted the exotic pomp and splendor of the Raj, which by then was already being opposed by a growing nationalism.

organization to claim members from all over the country. The Congress had British approval, but by the early 20th century its more radical members had begun to question Britain's right to rule India. In 1905 there was mass resistance to the partitioning of Bengal, which was duly annulled six years later.

The British took tentative steps toward Indian self-rule after World War I, but Indian hopes for independence were crushed by the Rowlatt Acts of 1919, which authorized imprisonment without trial. Mohandas Gandhi (1869–1948), a leading member of the Congress Party, and his followers resisted the new law by organizing massive displays of civil disobedience and noncooperation. By 1930, when the Congress Party pledged itself to a declaration of independence, Jawaharlal Nehru (1889–1964) and Subhas Chandra Bose (1897–1945) had become its effective leaders, and their policies were far more militant than Gandhi's.

After unproductive negotiations with



the Congress, Britain passed the Government of India Act in 1935, introducing a new federal constitution. But this satisfied no one. Congress fought the elections of 1936 in the hope of wrecking the new order, and to everyone's surprise won a decisive victory. When, in 1939, the British viceroy declared India to be at war with Nazi Germany, without having

consulted local leaders, all Congress ministers resigned in protest. A long and troubled series of negotiations, punctuated by rioting and bloodshed, finally brought full independence in 1947. The price of Hindu-Muslim enmity was the partitioning of the country. India retained the states with a Hindu majority, and the mainly Muslim areas to the east and

## Gandhi, the quiet revolutionary

Diffident, passive and terrified of public speaking, Mohandas Karamchand Gandhi (1869–1948) was an unlikely political activist. As a student he expressed no interest in politics and rarely read a newspaper. In 1893, newly qualified as a lawyer, the young Gandhi went to work in South Africa. The racial discrimination he experienced there transformed him into a passionate campaigner.

He spent seven years in South Africa encouraging Indians to defy racism by nonviolent means, such as fasting and strikes. This peaceful resistance, *satyagraha* – devotion to truth – proved a highly effective protest. By 1913 international pressure forced South Africa to compromise, and in 1914 Gandhi returned to India.

When, in 1919, the British government authorized imprisonment of Indians without trial, Gandhi launched a massive *satyagraha* in defense of civil



**Two of India's greatest leaders** – Mohandas Gandhi (right) and Pandit Jawaharlal Nehru – confer during the opening day of the All-India Congress Committee in July 1946. Gandhi initiated the passive resistance movement against British rule.

rights. In the unrest that followed, the British massacred some 400 Indians and declared martial law. Gandhi halted the campaign, and set about remodeling the Indian National Congress Party. Under his leadership it became a powerful instrument of change, using nonviolent noncooperation as its principal weapon. In 1922 Gandhi was convicted of sedition, and

imprisoned. On his release two years later he found the Congress Party divided by animosity between Hindus and Muslims.

In the late 1920s Gandhi began to demand dominion status for India and in 1930 launched a new and remarkably successful *satyagraha* against the imposition of salt tax. In 1931 he was imprisoned again, and left Congress from 1934 to 1942 to concentrate on a program for educating the poor. He was imprisoned once more in 1942, along with the entire leadership of the Congress, for demanding British withdrawal from India.

The British Labour government of 1945 was more sympathetic to Indian independence, and Gandhi was closely involved in the negotiations that granted dominion status in 1947. Relations between Hindus and Muslims however, again deteriorated, and riots broke out in 1946–47. Gandhi toured the country to defuse the situation, but was murdered by a fanatic while on his way to a prayer meeting in Delhi on 30 January, 1948.





northwest became the separate state of Pakistan. Both countries became British dominions. Of those states with no clear majority, Punjab (in the northwest) and Bengal (in the east) were each divided between the two nations. Kashmir, with a Muslim majority, remains a disputed territory. An estimated 8.5 million people were uprooted by partition, of whom some 400,000 died.

India's first prime minister was Jawaharlal Nehru. He tried to avoid alignment with either the Soviet Union or the West, but a border dispute with China in 1962 forced him to appeal for help to Britain, the Commonwealth and the United States. The incident was quickly settled, but in 1965, after Nehru's death, a dispute with Pakistan flared into open war. The issues were still not fully resolved when Nehru's daughter Indira Gandhi (1917–84) became prime minister in 1967,

and fighting broke out for a second time in 1971. The war led to the birth of a new nation – Bangladesh – formerly known as East Pakistan.

Faced with problems of food shortages, economic decline and political instability at home, Indira Gandhi suppressed opposition. She became increasingly unpopular, and in 1977 was voted out of office. Confusion followed, and in 1980 she was reelected in triumph. Soon afterward, however, the Sikhs began to agitate for their own autonomous state in the Punjab, and the struggle became increasingly bitter. In 1984 Indian troops attacked Sikh militants who had occupied the Golden Temple at Amritsar, the Sikhs' holiest shrine, killing 400 people. Shortly afterward, Indira Gandhi was assassinated by Sikh members of her own bodyguard. Her elder son Rajiv Gandhi (1944–91) was immediately appointed prime

**During Republic Day celebrations** – held every 26 January – elephants troop down Rajpath Avenue in India's capital, Delhi. Beyond are the red-sandstone walls of the government buildings, designed by the British architect Sir Edwin Lutyens (1869–1944).

minister and leader of the Congress Party.

Rajiv Gandhi lost the 1989 election, but the minority government had only a tenuous hold on power, and fresh elections in 1991 returned Gandhi's Congress Party with a fragile majority. However, Gandhi himself was assassinated during the course of the elections.

### Government

In 1950 India became the first republic to achieve independence within the British Commonwealth, and the world's longest written constitution came into force. By this, administration is divided between central and state governments.

The lower house of the two houses of





**Pedestrians and cyclists** amble through a broad street in Jaipur, Rajasthan. The city was founded in 1728 by Maharajah Jai Singh II, who decreed that all buildings should be painted pink, a color that his astrologers claimed was particularly auspicious for him.

parliament is called the House of the People (Lok Sabha). Members are elected for a five-year term and there may be up to 550 members. Most of these are elected from constituencies within the 25 states (including the disputed Jammu and Kashmir), but 20 are elected from the seven union territories – certain island, city and other small territories that do not belong to any of the states.

The Council of States (Rajya Sabha), the upper house, can have up to 250 members. Twelve are chosen by the president, while the rest are elected from the state assemblies under a system of proportional representation. Members serve a six-year term, with one-third of the membership replaced every two years.

The head of state is the president, who is chosen by elected members of both houses, as is the vice-president. However their duties are mainly ceremonial. Real power rests with the prime minister and council of ministers, who are both answerable to the House of the People.

Each of the states has its own governor, who is appointed by the president to serve a five-year term. The states also have their own assemblies, and six of them have two-chamber assemblies.

## People

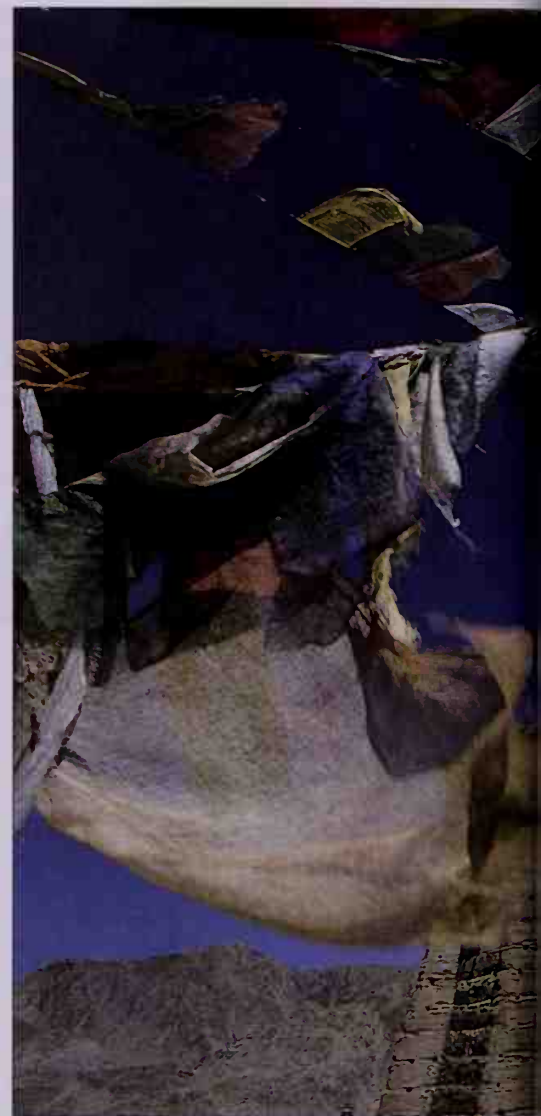
India's long and involved social history, with its succession of invasions, has created a complex racial mix and a rich diversity of languages. Linguists list more than 700 different languages and dialects, many of which bear little resemblance to

one another; 15 major languages have official state recognition.

The largest group is the Indo-Aryan languages, which are all related to Sanskrit and are spoken throughout northern and western India. Among them Hindi is used as a first or second language by more than four-fifths of the population, and after independence it became the official language of India alongside English, which is preferred in the south. Other major Indo-Aryan languages include Bengali, Marathi, Gujarati and Assamese. Languages belonging to the Dravidian group are confined mainly to southern India, but were once spoken over a much wider area. Four of the official state languages are Dravidian, including Tamil. Other language groups include many minor languages such as local dialects related to Tibetan and Burmese, which are spoken along the far northern and northeastern borders respectively.

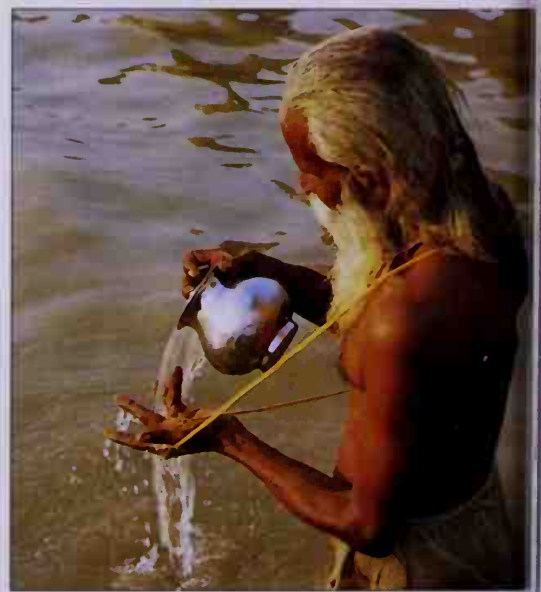
Culture and religion, rather than language, have preserved India's cohesion, but the situation is extremely complex. Even though India's dominant religion is Hinduism, more than one-tenth of the people are Muslim, and there are also significant Christian, Sikh, Buddhist and Jain minorities.

Hindu beliefs, which most of the population accept, have molded Indian society. The caste system divides Hindus into some 3,000 different groups according to their birthplace and occupation. Caste is hereditary, and members of different castes cannot intermarry without one of them "losing caste". The caste system has preserved craft skills and established valuable patterns of mutual help; it has also prevented the lowest caste – the "untouchables" – from improving their



**Colorful prayer flags** (above) flutter above the walls of a Tibetan Buddhist monastery in Leh, capital of India's northern Ladakh district. Every flag has a prayer printed on it, and it is believed that each flap of the cloth is equivalent to the prayer being recited.

**A high-caste Hindu** (below), identified by the sacred yellow thread around his neck, performs ritual ablutions in the river Ganges at Varanasi. According to Hindu myth the river once flowed through heaven, and is worshiped as a goddess able to wash away sins.







situation. Untouchability has been unconstitutional since 1950 but, like other practices dating back 3,000 years, it is not easy to change.

### ECONOMY

Export trade in India is not fully developed, and its products command only a small fraction of the world market. The balance of trade has tended to remain unfavorable, with imports outweighing exports, and the situation has been made worse by the decline in foreign aid and a mounting foreign debt. Despite government efforts to curb population growth, this continues to outstrip the country's economic growth, and its per capita gross national product remains among the lowest in the world.

#### Agriculture and fisheries

Agriculture remains the largest sector of the economy; more than two-thirds of the total labor force work on the land either full-time or part-time. Despite attempts to reform land ownership, many farms still consist of tiny smallholdings worked by peasants too poor to afford fertilizers or

machinery. Floods and droughts are a constant threat, but crop yields, though poor, are improving. The Green Revolution of the 1970s and 1980s led to the introduction of new strains of rice and wheat that have produced far better harvests, and irrigation is increasing.

Rice is the main food crop; over 4,000 varieties are grown. Wheat is cultivated in drier areas. Major cash crops such as

tea, coffee, rubber and pepper are grown on large plantations. Other cash crops including coconuts, jute, sugar cane and cotton are often grown on smallholdings.

India has the largest livestock population in the world, but Hindus venerate the cow and eat no beef. As a result, unrestricted grazing in some areas has led to soil erosion and damage to the landscape. Milk yield per animal is among the lowest in the world because of a shortage of fodder. India's massive continental shelf is rich in fish, and the fishing industry has grown rapidly since independence. In recent years steps have been taken to reverse the depletion of India's natural forests, most of which are owned and managed by the state.

#### Industry

Mineral extraction, a major industry, is generally government-controlled. Massive deposits of iron ore – about a quarter of the world's reserves – are being increasingly exploited, but iron production has not yet reached its peak. India also has valuable reserves of bauxite, manganese, copper, sulfur and salt, which await further exploitation. Gemstones remain a major export from India and from its neighbor, Sri Lanka.

In addition there are huge reserves of medium- and low-grade coal, as well as sizable deposits of lignite, and some oil. Petroleum production satisfies about one-half of the country's fairly modest requirements. Hydroelectric power stations make good use of natural resources, but more than one-half of India's electricity is

**Fishermen carry in the nets** from their boat in southern India. The rich waters off India's coasts offer a bountiful harvest of fish, such as sardines, anchovies and bummalo (also known as Bombay duck). In 1990 the country's total fish catch was 3.6 million tons.







**A steam train, en route for Agra,** hurtles across a bridge in northern India while below women and men wash clothing in the shallow Yamuna river. India's well-developed railroad system, created by the British in the mid 19th century, is the world's fifth largest.

supplied by thermal stations, and a small amount by nuclear power. Cow dung, or the biogas produced from it, is the fuel most used by rural populations.

Manufacturing is the fastest-growing sector of the economy. Consumer products such as textiles, bicycles and electrical appliances are made mostly by private companies. State-owned ventures concentrate on heavy industries, notably iron, steel, chemicals and engineering.

#### **Transportation and communications**

When India was under British rule, railroads were the main form of mass transportation. Otherwise goods were carried by ox-carts or by river. Even after independence the emphasis on railroads remained, though several major trunk roads were built for strategic or commercial purposes. Today India's rail network is not only one of the biggest in the world, it is also the country's largest state enterprise. Steam locomotives are still widely used, but the system is being modernized and new railroad equipment gradually introduced.

Although road and rail improvements have reduced the importance of India's extensive inland waterways, some areas, especially around the Ganges delta and in Kerala in the far southwest, still rely very much on river transportation. The country's major seaports include Calcutta and Madras on the east coast, and Bombay and Cochin on the west.

There are three national airlines: Air India serves international destinations, Indian Airlines operates domestic flights and Vayudoot caters for otherwise inaccessible areas of the northeast.

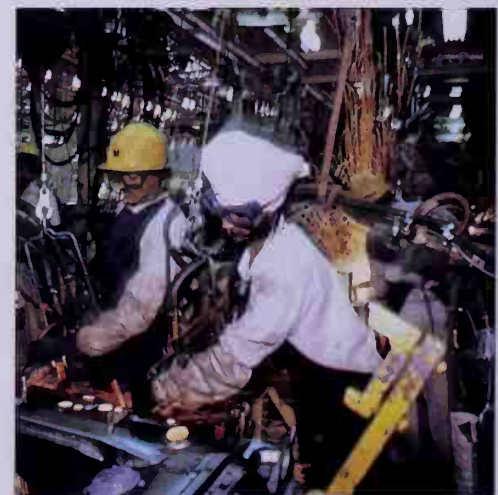
India's press functions with very few restrictions, but because of the huge number of languages many newspapers have fairly small circulations. The most powerful communications media are radio and television, which are both state-controlled. The Indian film industry is among the largest in the world.

#### **Health and welfare**

Poverty and malnutrition are widespread. Many villages lack clean drinking water, and diseases such as dysentery are common. Malaria, tuberculosis and cholera have been controlled to some extent, but resources are overstretched. Efforts have been made to promote birth control, but even so the population continues to rise.

Despite the lack of resources education-facilities have improved. Education is mainly the responsibility of individual state governments, and is usually free of charge but not compulsory. Teaching at most secondary schools is in Hindi or English as well as in the local language. Literacy has more than doubled since independence, and adult education programs are widespread.

**Car assembly** of one of India's new range of cars, the Maruti. The Indian car industry was once identified almost entirely with a local version of Britain's old Morris Oxford, but Maruti – backed by Suzuki's technology – brings it well into the modern age.





# Bhutan

KINGDOM OF BHUTAN



IN THE EASTERN HIMALAYAS, SANDWICHED between Tibet (now occupied by China) to the north and India to the south, is the tiny kingdom of Bhutan. Like Tibet, Bhutan has long been isolated from international politics and commerce, and is regarded by the rest of the world as a secret and mysterious kingdom.

## ENVIRONMENT

Bhutan is a country of high mountains and deep valleys that divides naturally into three main geographic regions. The lowlands along the southern border are known as the Duars Plain. From here the land rises sharply to the rugged mountains and broad valleys of the Lesser Himalayas. Above these tower the Great Himalayas, topped by massive peaks along the Tibetan border.

The climate ranges from subtropical in the south to Alpine in the north; the summer rains are heavy in places, falling as snow on the higher peaks. Most of the people live in the temperate central valleys, where there is seasonal pastureland. The southern lowlands and slopes are a mixture of dense bamboo forests and savanna, which support wildlife such as elephants and tigers. The mountains are home to hardy mountain animals such as yaks and tahrs (a species of wild goat).

## SOCIETY

Bhutan's origins are shrouded in legend, but historians believe that the land was settled by migrants from Tibet in the 9th century AD. In about the 16th century a Tibetan monk is thought to have assumed both temporal and spiritual authority over a group of mountain and hill peoples. After him, power was divided between a spiritual leader, the *Dharma Raja*, who was chosen as the reincarnation of his predecessor, and a secular

leader, the *Deb Raja*. The last *Dharma Raja* died in the early 20th century, and no new spiritual leader was identified. In theory the *Deb Raja* was elected by a council of governors, but from the 19th century military commanders fought each other for political power. In 1907 the British, the colonial power in the subcontinent, encouraged Bhutan to put an end to this situation by installing a hereditary monarchy – *Druk Gyalpo*, the Dragon King. Bhutan's external affairs were managed by the British until they withdrew from the subcontinent in 1947.

The first Dragon King's grandson, Jigme Dorji Wangchuk (1928–72), introduced limited social reform aimed at improving living standards without sacrificing traditional culture. Slavery was not abolished until the 1960s, when the first real towns were developed. The reign of his son, Jigme Singye Wangchuk (b. 1954), has been troubled by unrest among refugees from Tibet, and later among the Nepalese minority, who wanted democratic reforms like those being implemented in Nepal. Few concessions were granted. The Nepalese-speaking Hindus of southern Bhutan won little support for change among the majority Bhutia, who are Buddhists and speak Tibetan dialects.

The Dragon King remains the sole ruler, advised by a cabinet and a partly elected national assembly (there are no political parties). The society he presides over is still isolationist. From 1988 foreign tourists were banned (except for escorted groups), ostensibly because of art thefts from monasteries. In 1990 a law was passed forbidding people from watching foreign or satellite television.

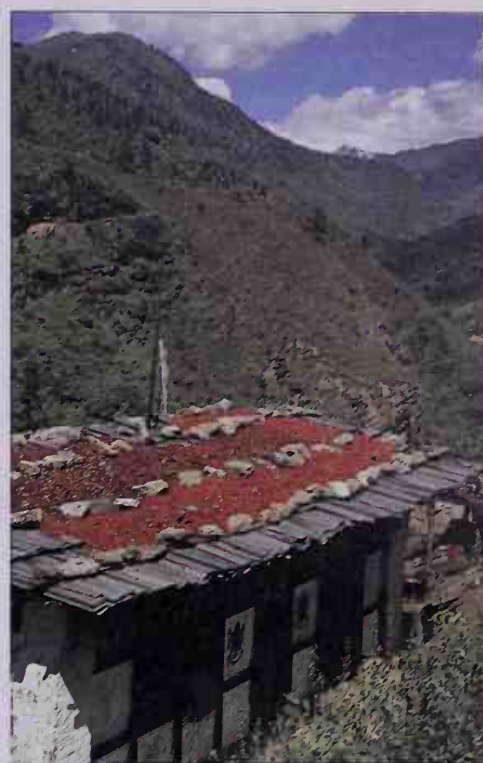
## ECONOMY

Agriculture, at a little above subsistence level, is the mainstay of the economy. Most Bhutanese are farmers, for whom rice, potatoes and buckwheat are among the major crops. Livestock farming and forestry are also significant.

The chief mineral and energy reserve is coal, but dolomite, limestone and gypsum are also mined. Industrial output consists largely of food, timber and pulp products. Along with hydroelectricity these are the main exports. Almost all trade is with India, which supplies the country with manufactured goods.

There are few roads in Bhutan, and air travel is largely confined to government helicopters. Welfare, healthcare and education are unavailable to most people, and there is widespread illiteracy.

## THE INDIAN SUBCONTINENT



Hot peppers or chilies lie spread out to dry on a roof in a mountain valley in Bhutan. Only 9 percent of the country is cultivated, the rest being either forested or too mountainous. Yet the Bhutanese are largely self-sufficient in food, having to import mainly rice. Together with staple crops they grow oranges, apples and cardamom.

## NATIONAL DATA

<b>Land area</b>	47,000 sq km (18,150 sq mi)			
<b>Climate</b>	<b>Altitude</b>	<b>Temperatures</b>		<b>Annual</b>
	m (ft)	January	July	precipitation
		°C(°F)	°C(°F)	mm (in)
Thimphu	2,265 (7,431)	4 (39)	17 (63)	3,000 (118.0)
<b>Major physical feature</b>	highest point: Kula Kangri			
	7,554 m (24,783 ft)			
<b>Population</b>	(1990) 1,516,000			
<b>Form of government</b>	nonparty constitutional monarchy with one legislative house			
<b>Armed forces</b>	army 5,000			
<b>Capital city</b>	Thimphu (60,000)			
<b>Official language</b>	Dzongkha (a form of Tibetan)			
<b>Ethnic composition</b>	Bhutia 62.5%; Gurung 15.5%; Assamese 13.2%; others 8.8%			
<b>Official religion</b>	Mahayana Buddhism			
<b>Religious affiliations</b>	Buddhist 69.6%; Hindu 24.6%; Muslim 5.0%; others 0.8%			
<b>Currency</b>	1 ngultrum (Nu) = 100 chetrum			
<b>Gross national product</b>	(1989) US \$288 million			
<b>Gross domestic product</b>	(per person 1990) US \$520			
<b>Life expectancy at birth</b>	male 49.2 yr; female 47.8 yr			
<b>Major resources</b>	agriculture/fisheries 44.3% GNP; mining 0.8% GNP; manufacturing 5.7% GNP; public utilities 10.0% GNP; public administration/defense 12.9% GNP			



# Pakistan

ISLAMIC REPUBLIC OF PAKISTAN



PAKISTAN OCCUPIES THE NORTHWESTERN corner of the Indian subcontinent. To the west is Iran, to the northwest Afghanistan, to the northeast China and to the east India. Control of the former state of Jammu and Kashmir to the northeast is disputed with India.

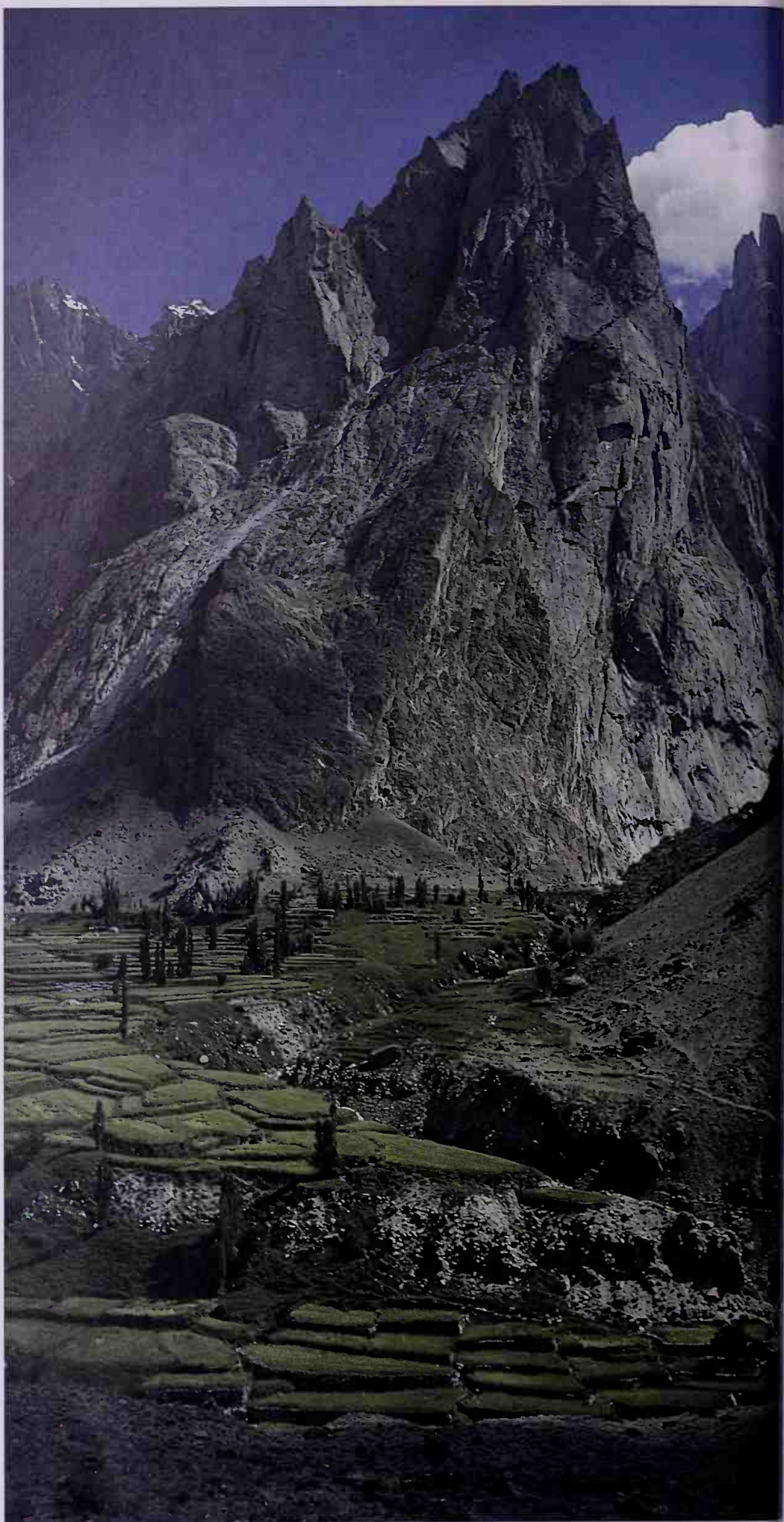
## ENVIRONMENT

If Egypt is the land of the Nile, then Pakistan is the land of the Indus. Rising in the Himalayas to the northeast, the Indus river drains the whole of Pakistan from the high northern plateaus to the southern plains. Like Egypt, Pakistan is an arid and mostly treeless country, dependent for its survival on irrigation canals supplied by varying and unreliable seasonal rains.

### The land

In the northeast the Himalayas form a massive mountain barrier that includes some of the highest peaks in the world. Much of the northwestern frontier is also mountainous highlands. Along the frontier with Afghanistan, the Khyber Pass opens out into an irregular plateau along the foot of the Himalayas. The plateau includes the Vale of Peshawar and other broad valleys interspersed with high ridges, including the Salt Mountains. Farther south are the plains of the Punjab – the fertile heartland of Pakistan – watered by the Indus and its tributaries.

In the southwest is the arid plateau of Baluchistan, tapering away to sandy desert in the far southwestern corner. East of the plateau, the flat plains of Sind merge with the Indus delta. The far south, along the Arabian Sea coast, is vulnerable to heavy flooding. The arid landscapes of the southeast borderland are an extension of India's Thar Desert.





### Climate

Pakistan has a continental climate, characterized by very hot summers and cool winters with large daily variations in temperature. In the far north winters are much colder, and many of the northern mountains have permanent snowfields. By contrast, the Baluchistan plateau is warmer than any other part of the country in winter. Coastal regions have more even temperatures, with less seasonal variation, because of the sea breezes.

Most of Pakistan's rain falls between July and September, when monsoon winds blow from the southwest. Rainfall in the north can be up to 10 times heavier than in the south, but amounts vary widely from year to year, and a catastrophic drought may be followed by an equally catastrophic flood.

### Plants and animals

Over much of the country vegetation is sparse, consisting of tough grasses, dry bushes and scrubland. In the northwest, there are forests of pine, deodar and ilex, while deciduous trees such as plane and poplar grow in the far north.

The mountains are rich in wildlife, including bears, leopards and wild sheep, and in the Sind district of the southeast

the Manchhar Lake is home to many water birds. Crocodiles and pythons are among the reptiles that inhabit the Indus delta. Predators such as jackals and foxes are found throughout the country. With forest cover reduced to 3.5 percent of the land area, animal habitats are threatened, and rarer species such as the Snow leopard are now endangered.

### SOCIETY

Considerable social problems have persisted in Pakistan throughout much of the state's history. They include ethnic violence and unrest, political instability, poverty, disease, malnutrition, a mounting foreign debt, and the long-running territorial dispute with India over the partition of Jammu and Kashmir.

### History

The modern state of Pakistan is a young nation, but the territory and its peoples have a long history; the Indus civilization dates from about 2500 BC. For most of its history, Pakistan was treated as part of India, its much larger neighbor, with whom it shares much of its culture.

Pakistan was created in 1947, when the Muslim-dominated northeastern and

northwestern states of India were given autonomy at the end of British rule. Part of Bengal in the east, and part of Punjab in the west were partitioned off from India, creating the new divided nation of East Pakistan and West Pakistan; the two areas were separated by a wide tract of Indian territory. The status of Jammu and Kashmir in northern India has remained in dispute ever since, and the dislocation of the two parts of the new state created problems from the outset.

Initially Pakistan was established as a dominion within the British Commonwealth, but in 1956 an Islamic republic was proclaimed. The new constitution proved difficult to implement, and in 1958, following a military coup, the country was placed under martial law. Although there were some moves toward democracy, General Mohammad Ayub Khan (1907–74), who had led the coup, was still in power in 1965 when disputes with India over the Kashmiri border erupted into war. He resigned in 1969, after widespread unrest, and full martial law was reimposed under General Agha Mohammad Yahya Khan (1917–80). During the elections of 1971 East Pakistan made repeated demands for independence from West Pakistan, amid many

**Verdant terraces** (left) in the Hushe river valley near Skardu in northern Pakistan, where barley is grown in irrigated plots beneath the barren scree slopes of the mountains. Snowmelt feeds the Hushe river, a tributary of the Shigar, which itself feeds the mighty Indus.

**Muslim faithful** (below) face toward Mecca as they gather in the courtyard of the Mahabuk Khan mosque in Peshawar, northwestern Pakistan; some have already prostrated themselves in prayer. Islam is the dominant and official religion of Pakistan.



### NATIONAL DATA

**Land area** 796,095 sq km (307,374 sq mi)

Climate	Altitude m (ft)	Temperatures		Annual precipitation mm (in)
		January °C (°F)	July °C (°F)	
Islamabad	511 (1,644)	10 (50)	32 (90)	900 (35.4)
Karachi	4 (13)	16 (61)	30 (86)	196 (7.7)

**Major physical features** highest point: K2 8,611 m (28,250 ft); longest river: Indus 2,900 km (1,800 mi)

**Population** (1990) 112,050,000

**Form of government** federal multiparty republic with two legislative houses

**Armed forces** army 500,000; navy 20,000; air force 45,000

**Largest cities** Karachi (5,181,000); Lahore (2,953,000); Faisalabad (1,104,000); Rawalpindi (795,000); Hyderabad (752,000); Multan (722,000); Islamabad (capital – 204,000)

**Official language** Urdu

**Ethnic composition** Punjabi 48.2%; Pashto 13.1%; Sindhi 11.8%; Saraiki 9.8%; Urdu 7.6%; others 9.5%

**Official religion** Islam

**Religious affiliations** Muslim 96.7%; Christian 1.6%; Hindu 1.5%; others 0.2%

**Currency** 1 Pakistan rupee (PR; plural PRs) = 100 paisa

**Gross national product** (1989) US \$40,134 million

**Gross domestic product** (per person 1990) US \$1,770

**Life expectancy at birth** male 59.3 yr, female 60.7 yr

**Major resources** agriculture/fisheries 22.7% GNP; mining 0.6% GNP; manufacturing 15.2% GNP; trade 15.0% GNP; public administration/defense 7.4% GNP



accusations of oppression and injustice. In the civil war that followed, India supported the cause of East Pakistan, and in 1972 that territory became the independent state of Bangladesh.

President Yahya Khan was forced to resign, and the opposition leader Zulfikar Ali Bhutto (1928–79) took control. His regime, initially popular, became increasingly autocratic, and although he won the 1977 election, his victory roused a storm of protest that ended with the renewal of martial law under General Zia-ul-Haq (1924–88). Bhutto was arrested, convicted of attempted murder, and executed.

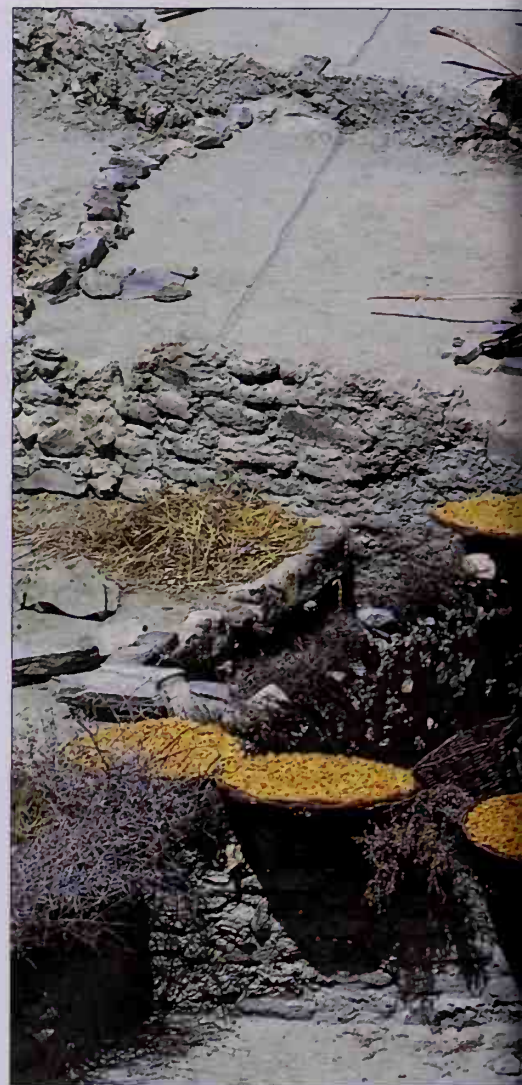
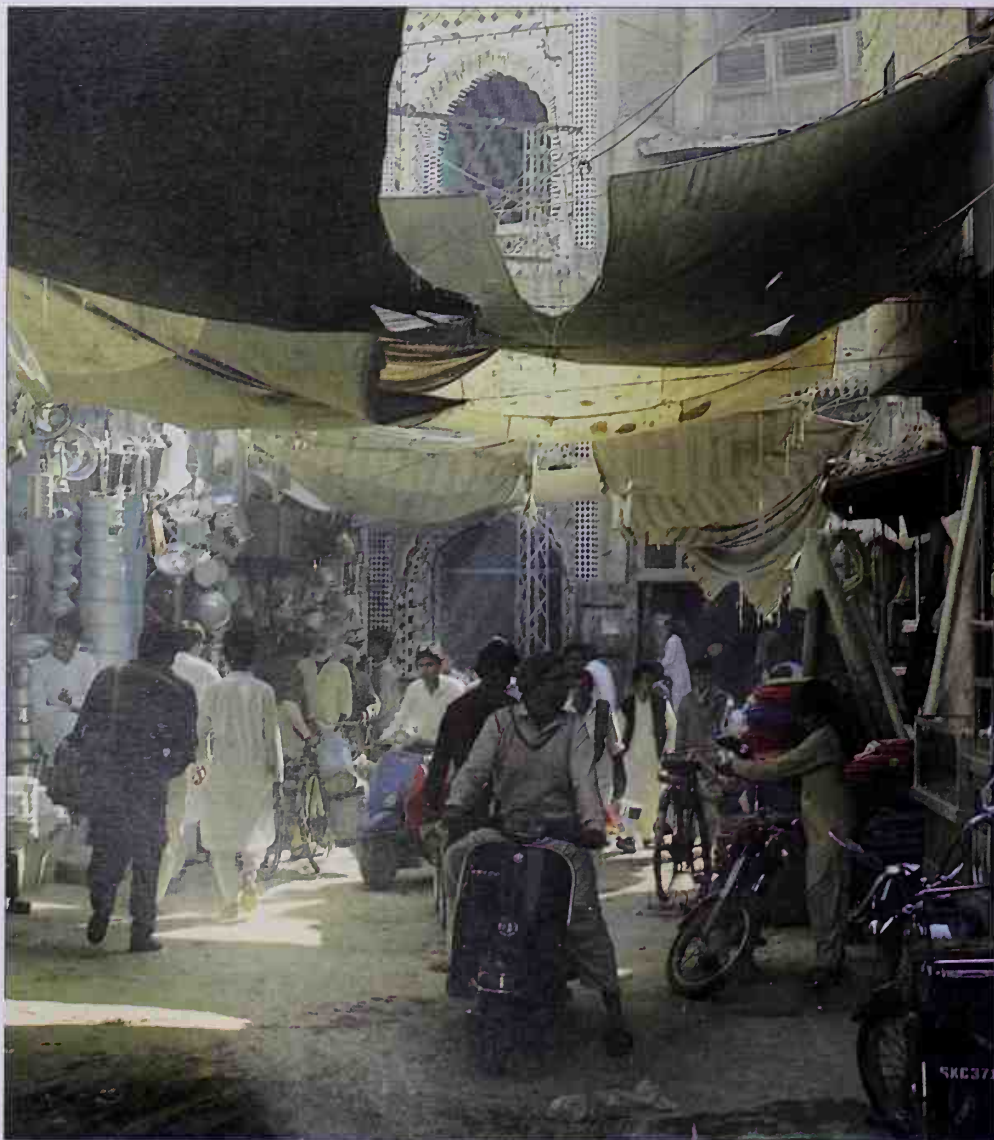
Zia-ul-Haq's death in an air crash in 1988 opened the way for multiparty elections. Bhutto's Pakistan People's Party (PPP) was returned to power under the leadership of his daughter Benazir Bhutto (b. 1953). However, increasing provincial unrest, coupled with harsh measures to stamp out the drug trade, and allegations of corruption within the PPP itself, led to her defeat in the elections of 1990.

### Government

Pakistan has two legislative bodies; the national assembly and the senate. The national assembly is headed by the prime minister, and its members are directly elected by popular vote. Members of the senate are chosen by the four provincial assemblies. The president, who is both head of state and commander of the armed forces, is chosen by an electoral college made up of the national assembly, the senate and the provincial assemblies.

The balance of power between the central government and the four provinces – Sind, Punjab, the Northwest Frontier and Baluchistan – is a source of continuing friction, and a number of extremist groups in Sind are agitating for complete independence.

**Shaded shoppers** (below) In a market street in Sukkur, a port on the Indus river in southeastern Pakistan, motorcyclists and pedestrians are shaded from the midday sun by overhanging tarpaulins. Sukkur is a thriving commercial and industrial center, with a rich tradition of handicrafts.



### People

The people of Pakistan are racially mixed, owing to centuries of invasions and migrations, and it is often language rather than race that separates one group from another. However, there is ethnic conflict in Sind, where native Sindhis feel threatened by large numbers of Urdu-speaking immigrants – Muslim refugees from India following the partition in 1947.

The main linguistic division is between Iranian languages such as Baluchi and Pashto, and the Indo-Aryan group, which includes Punjabi, Sindhi and Urdu. Although Urdu is the official language, most people speak it only as a second language. The official religion is Islam, practiced by the vast majority of the population.

### ECONOMY

Despite growing diversification in the industrial sector, Pakistan's economy remains heavily dependent on cotton and cotton manufactured goods. In spite of the efforts that have been made by the government to restrict imports and encourage the production of a greater range of export goods, there is still a significant balance-of-trade deficit.





**Flat baskets of apricots** (above), set out to dry in the sun, bring splashes of color to the roofs of a village in Pakistan's northerly Hunza Valley. Agriculture is an important sector of Pakistan's economy, and is the main source of income for rural people.

**Karachi vendor** (below) In Pakistan's largest city, a streetseller offers passersby a tempting mountain of freshly made samosas – nourishing parcels of mixed vegetables or meat, wrapped in deep-fried pastry. An array of sweets is also on display on the stall behind.



### Agriculture

More than half of Pakistan's population is employed in agriculture, though this now accounts for less than a quarter of national income. As in India, the system of land ownership and smallholdings is inefficient, and agricultural reforms have yet to take full effect. Irrigation by a network of canals is widespread, but has caused the loss of some farmland through salinity. Pest control, too, is inadequate. Yet, despite such problems, the new techniques and machinery introduced in the "green revolution" of the 1970s have helped to provide a surplus of wheat, rice and sugar, all available for export. Livestock, including sheep, goats, cattle, buffalo and camels, are numerous. However, the yields of milk and meat are relatively low because of the shortage of fodder. Forestry is minimal, but fishing is a significant growth industry.

### Industry

Pakistan has some coal, oil and high-grade iron ore, but these make only a small contribution to the economy. Other mineral deposits, including both copper and bauxite, have not yet been fully exploited or are low-grade. However,

limestone – easily mined in quantity – is the basis of a growing cement industry. At the moment hydroelectric plants meet about three-fifths of the country's energy requirement and imported fuel meets the rest of its energy needs, but large reserves of natural gas are being exploited to fuel new power stations. The development of nuclear power has been discouraged because of India's objections and the safety factor.

Manufacturing industry is growing steadily as the country increases its energy production. The cotton industry developed rapidly after independence, and is still very important today. Other products including leather, wool and sugar are now processed for the home market and for export. The production of consumer goods has also expanded since the 1950s, but both raw materials and machinery still have to be imported. Heavy industry has been government-controlled since 1971.

### Transportation and communications

Buses and trucks have displaced railroads and bullock carts as the most popular forms of transportation. Pakistan's main road and rail routes link the principal seaport, Karachi, to Lahore, Islamabad (the capital), and ultimately to Peshawar near the Khyber Pass. The national carrier, Pakistan International Airlines, offers an internal and international service.

Freedom of the press in Pakistan has been sporadic; and censorship in one form or another has generally been the rule. The circulation of newspapers and magazines is limited by language barriers and by poor literacy levels so the government-controlled radio network is the main source of news and opinion.

### Welfare and education

Healthcare in Pakistan suffers from a shortage of trained staff. Malnutrition is widespread, and infectious diseases have yet to be brought properly under control. At least one out of every 10 Pakistani children dies in infancy, but average life expectancy is improving.

Welfare services are limited, though there is some basic provision for the sick, for mothers and for those injured at work. Small pensions are paid to the old and disabled. Primary education is free and widely available, but only a minority receive secondary or higher education. Literacy rates are improving, but remain comparatively low, especially among women, as there is a tendency to keep girls away from school.



# Nepal

KINGDOM OF NEPAL



**N**EPAL IS A SMALL LANDLOCKED KINGDOM in southern Asia lying between India to the south and Tibet (now occupied by China) to the north. Most of the country is in the foothills and slopes of the Himalayas. The mountainous terrain has done much to shape the culture and history of the Nepalese people, who have spent centuries in geographical and self-imposed isolation.

## ENVIRONMENT

Nepal's landscape changes dramatically from the low plains of the south to the Great Himalayan range on the northern frontier. The Tarai lowlands along the

southern border are part of India's Gangetic Plain. These give way to the Churia foothills farther north, and then to the higher Mahabharat ranges. Still farther north, across the Kathmandu Valley, are the Himalayas, including Mount Everest, the world's highest peak at 8,848 m (29,028 ft).

The climate ranges from subtropical in the south to Alpine in the north. The summer brings heavy monsoon rains, and snow in the higher mountains. The western half of the country tends to be drier than other areas.

Because of its rich soils, the Tarai is the most fertile area, though much of it is swamp or forest. More than half of Nepal is still forested, ranging from acacia and sissoo forests in the Churia, to pines, oaks and rhododendrons in the Mahabharat and lower Himalayas.

The Tarai is rich in wildlife, with tigers, leopards and even a few rhinoceroses. In the higher forests there are some antelopes, bears and deer, while above the tree line are wild sheep and goats, Snow leopards and yaks. The brilliantly colored Himalayan monal – a species of pheasant – is the national symbol of Nepal, while the legendary yeti, or Abominable Snowman, is still believed by some to inhabit the highest slopes

## SOCIETY

Situated between the Indo-Aryan culture of northern India and the Mongoloid culture of Tibet, Nepal has been greatly influenced by both throughout its history. From the 10th to the 18th century, Nepal was ruled by the Indian Malla dynasty. Then in 1769 it was conquered by the expanding Gurkha principality under its ruler Prithvi Narayan Shah (1720–75), who established the capital at Kathmandu and began a campaign of conquest. This brought Nepal into conflict with the expanding British empire in India. The Shah dynasty eventually became mere figureheads for other more powerful families such as the Ranas. In 1860 the Ranas were faced with the prospect of British rule, and agreed, as a price for continued self-government, to allow Nepalis to be recruited into the British army. These recruits made up the first of the famous Gurkha regiments.

In 1950 constitutional monarchy was restored. Nine years later, King Mahendra (1920–72) introduced a new constitution giving himself greater powers. His son Birendra (b. 1945) introduced some reforms, but in 1990 was forced by popular unrest to approve a new, more democratic constitution.

Most Nepalese are of Indian descent, but many minority groups in the north and east have closer linguistic and cultural links with Tibet. Southern Nepal is

### NATIONAL DATA

**Land area** 147,181 sq km (56,827 sq mi)

Climate	Altitude m (ft)	Temperatures		Annual precipitation mm (in)
		January °C (°F)	July °C (°F)	
Kathmandu	1,334 (4,376)	10 (50)	24 (75)	1,328 (52.3)

**Major physical features** highest point: Mount Everest 8,848 m (29,028 ft); longest river: Karnali (part) 920 km (570 mi)

**Population** (1990) 19,143,000

**Form of government** multiparty constitutional monarchy with two legislative houses

**Armed forces** army 35,000

**Capital city** Kathmandu (235,000)

**Official language** Nepali

**Ethnic composition** Nepalese 58.4%; Bihari 18.7%; Tharu 3.6%; Tamang 3.5%; Newar 3.0%; others 12.8%

**Official religion** Hinduism

**Religious affiliations** Hindu 89.5%; Buddhist 5.3%; Muslim 2.7%; Jain 0.1%; others 2.4%

**Currency** 1 Nepalese rupee (NRs, plural NRs) = 100 paisa (pice)

**Gross national product** (1989) US \$3,206 million

**Gross domestic product** (per person 1990) US \$950

**Life expectancy at birth** male 55.4 yr, female 52.6 yr

**Major resources** agriculture/fisheries 55.3% GNP, mining 0.2% GNP, manufacturing 5.8% GNP, finance 6.8% GNP, services 8.8% GNP

**A cornucopia of vegetables** at a market in Kathmandu, Nepal's capital city. Most Nepalese live as subsistence farmers in scattered communities, often producing crops on heavily fertilized, thin-soiled terraces that have been carved out of the plains and lower hillslopes.





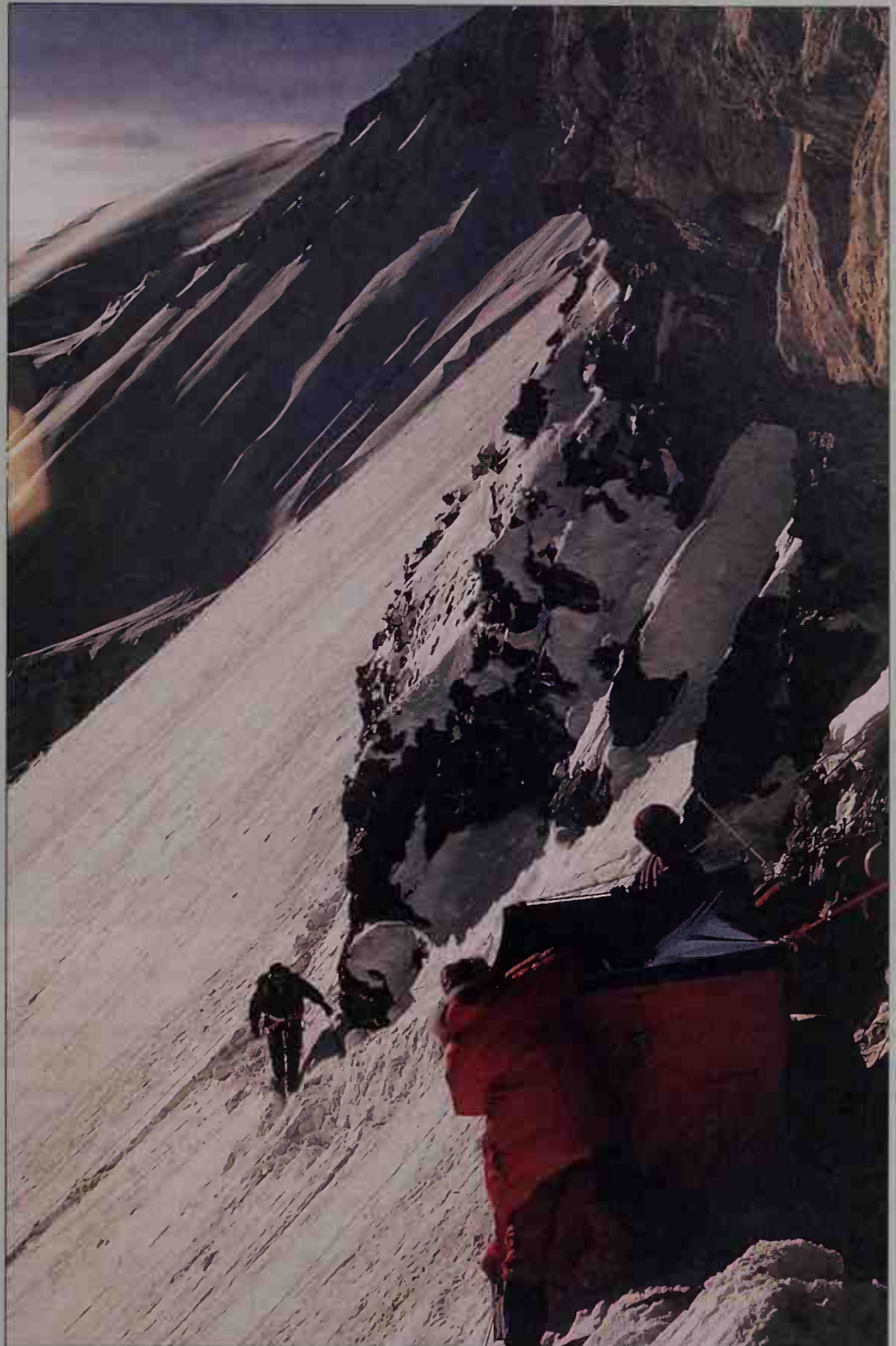
## Everest – the “Goddess Mother”

Mount Everest, in the Himalayas on the border between Nepal and Tibet, is the highest point on earth. At the summit, 8,848m (29,028 ft) above sea level and two-thirds of the way into the atmosphere, oxygen is thin and it is too cold for plant or animal life. Snow falls in the summer, the product of monsoons that drench the continent below; in winter, fierce gales blow the snow away from the peak of the mountain the Tibetans call Qomolangma – “Goddess Mother of the World.”

In 1865 the mountain was given its English name, Everest, after a former British surveyor-general. Efforts to ascend the peak from the Tibetan side began in 1920, but were failures.

In 1953, a British expedition under the leadership of John Hunt (b. 1910) established camps along the southwest side from Nepal, up the Khumbu glacier and the peak of Lhotse, to a rocky ridge known as the South Col. The Hunt team's equipment included oxygen systems, insulated clothing and portable radios. From South Col, on 29 May 1953, New Zealand-born Edmund Hillary (b. 1919) and the Nepalese Tenzing Norgay (1914–86) climbed to the peak of Mount Everest and stood side by side staring out across the roof of the world – the first humans to do so. Later climbers have made so many ascents since then that the litter from their expedition camps marks a trail of conquest up the once inviolable mountainside.

**An international Everest expedition** at Camp III, 7,000 m (23,000 ft) up on Everest's southwest face. The mountain straddles Nepal's border with Tibet. Its summit was first reached on 29 May 1953.



the birthplace of the Buddha (563–438 BC), and has many fine ancient Buddhist shrines. Today, the majority of the Nepalese population is Hindu.

### ECONOMY

Most of the population live by subsistence farming using methods that have hardly changed for centuries. There is limited irrigation, and crop yields (rice, wheat, sugar cane, potatoes and millet) are relatively low. Although Nepal is self-sufficient in staple foods, distribution is hampered by poor transportation.

Livestock includes cattle, sheep, goats and buffaloes. Commercial forestry generates a large number of products for export, but deforestation and subsequent erosion is a problem.

Nepal's mineral resources include coal, iron ore and copper, but reserves are small and little has been done to exploit them. Manufacturing is mostly local and on a small scale. The largest factories are processing plants for agricultural produce such as jute, sugar, meat and rice.

Many businesses are run by Indian nationals, and, predictably, most of Nepal's trade is with India. Tourism is an

expanding area, especially around Kathmandu. Because of the mountainous terrain, transportation is still very basic. However, many new roads have been built, and the Royal Nepal Airline Corporation operates both domestic and international flights.

Outside the main cities healthcare is rudimentary. The most popular form of treatment among the people is based on ancient Hindu folk remedies. The government's school-building program and its drive to increase literacy are beginning to have some impact, but the literacy rate is still relatively low.



# Bangladesh

PEOPLE'S REPUBLIC OF BANGLADESH



THE SMALL DENSELY POPULATED COUNTRY OF Bangladesh covers the territory that was previously East Pakistan, and was part of the British-ruled Indian province of Bengal and Assam before 1947. Now India lies to the west, north and east. To the southeast Bangladesh shares a short border with Burma, and the southern coastal area fronts the Bay of Bengal.

## ENVIRONMENT

Bangladesh occupies the eastern two-thirds of the Ganges-Brahmaputra delta. The land is extremely fertile because of the constant deposits of fresh silt and sand carried downstream by the rivers. However, it is highly vulnerable to flooding from both the rivers and the sea, especially during the summer monsoon season. In recent years soil erosion from deforestation upstream has made this flooding even more devastating.

### The land

The landscape of Bangladesh is dominated by water. It is mostly a country of flat plains criss-crossed by rivers and channels flowing into the sea. Large areas of low land are taken up by marshes, swamps and lakes. The Sundarbans, a huge mangrove forest in the south, is one of the largest swamplands in the world. In the northwest are the Chalan wetlands, huge expanses of marsh, and numerous lakes have formed in the northeastern and central areas. The flatness of the land is only broken up in the far northeast and in the southeast, where the higher Chittagong Hills run parallel to the Burmese border. The rest of the Chittagong region in the southeast is composed of small hills, valleys and forest, with several offshore islands and the world's longest beach, at Cox's Bazaar.

### Climate

The warm, wet, windy and humid climate is typical of a monsoon area. Most of the annual rainfall occurs in the summer monsoon season, from June to October. In winter the northeasterly winds bring dry, warm days and cool nights. The winds change direction late in March, when there are torrential thunderstorms. In April and May, and at the end of the summer monsoon, severe cyclones create massive storm surges causing flooding in coastal areas. The consequences can be catastrophic. In 1991 a cyclone in the Bay of Bengal killed as many as 200,000 people, left millions homeless, and did extensive damage to the local economy.

### Plants and animals

The fertile soil of Bangladesh encourages lush vegetation. Bamboo and rattan grow in the eastern forests, and central and southern areas are rich in plants adapted to swampy conditions. The Sundarbans have more than 300 plant species, among them various types of mangrove and the Sundari tree, which gives the swamp its name. Fruit trees, including date and coconut palms and mangoes, are cultivated in the densely populated inland areas of Bangladesh.

The country's wildlife includes several endangered species, notably the Bengal tiger, the Clouded leopard and the Asiatic elephant. Rhesus monkeys, jackals, mon-gooses and various species of deer are much more widespread.

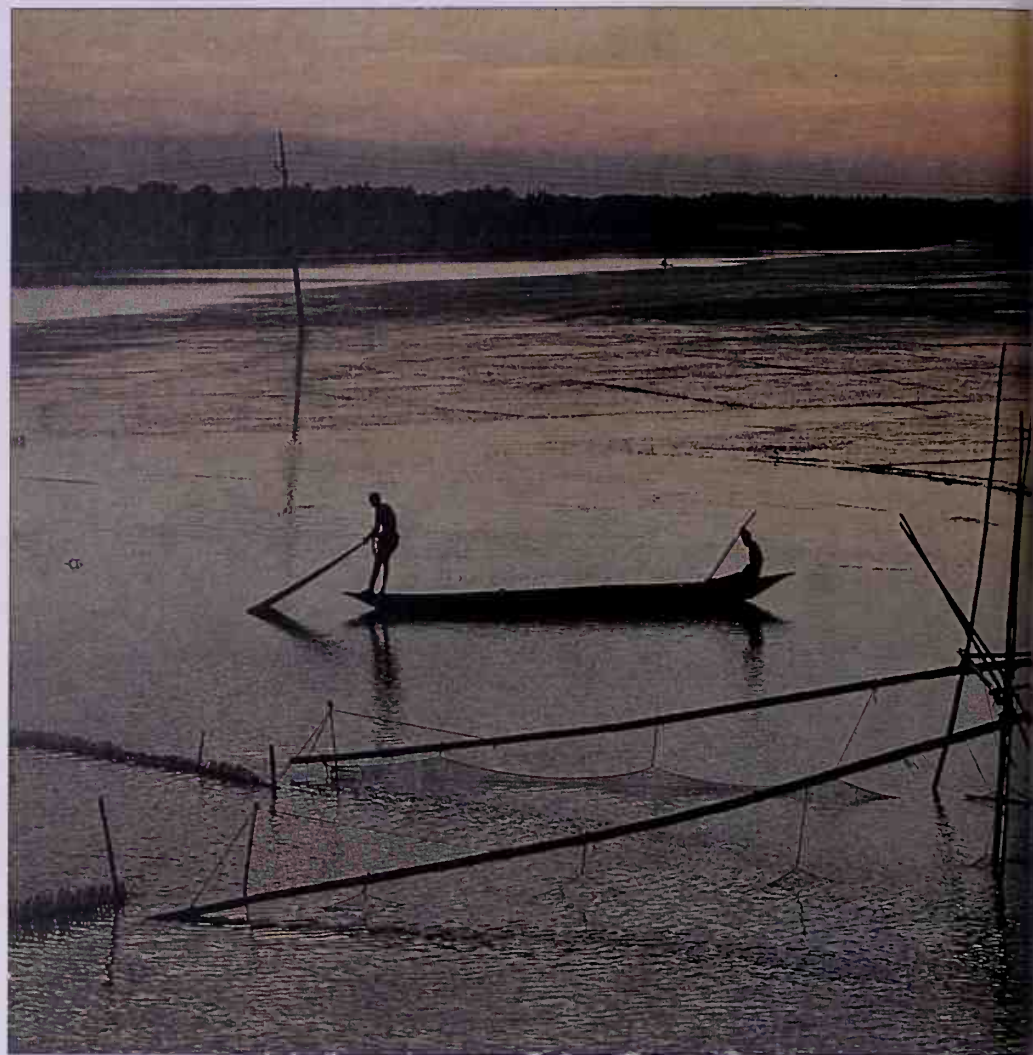
## SOCIETY

The name Bangladesh means "land of the Bengalis". Throughout their history the Bengali people, some of whom live in neighboring India, have played an important part in the history and culture of the subcontinent.

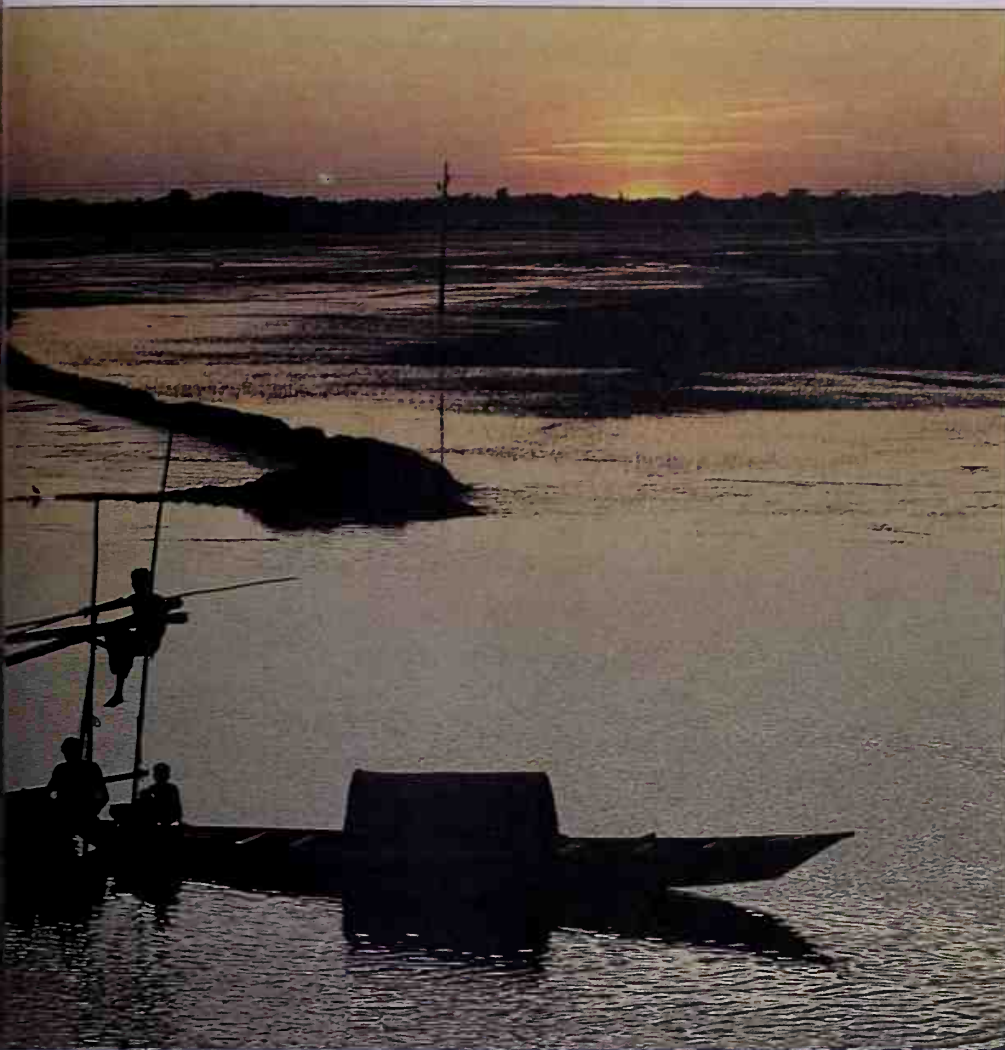
### History

In the 4th century Bengal was part of the Mauryan Indian empire, ruled by the Buddhist and later Hindu kingdoms and empires of northern India. A distinct Bengali language and literature had evolved by the 11th century, and after the 13th century Islam became the majority religion of Bengal.

From the mid 17th century onward Britain's power and influence grew in India, and by 1760 British rule was established in Bengal. As a British colony, Bengal was still administered by the Hindu ruling classes, increasing tension







**Fishermen near Kurigram** (above) in northern Bangladesh wait patiently for fish to enter their nets. The fish breed in the rivers, and when the waters flood the neighboring paddyfields – as the Brahmaputra river has done here – the protein-rich fish are caught.

**Ox-power** (below) A Bangladeshi farmer urges his two bullocks on as a youngster feeds sugar cane into a primitive, but effective, crushing machine that is being powered by the animals. Sugar cane – a source of sugar – is one of the country's principal crops.



between Hindus and Muslims. In 1905 the British partitioned Bengal into a Hindu-dominated western province and a Muslim-dominated eastern province. Western Bengal objected strongly, and in 1906 the All-India Muslim League was founded to protect Muslims' interests. The British were forced to reunite the two provinces in 1912, but hostility continued

between Muslims and Hindus.

In 1947, as British rule in India ended, the country was partitioned along religious lines by creating the state of Pakistan. East Bengal became East Pakistan, despite being separated from West Pakistan by some 1,500 km (1,000 mi) and having a completely different language and culture. The Bengalis of East Pakistan felt increasingly marginalized by the western-dominated central government, and formed the Awami League, a political party campaigning for Bengali autonomy. In the 1970 elections, the Awami League won virtually every seat in East Pakistan, giving them a majority in the National Assembly. But the Pakistan government, instead of convening the Assembly, sent troops into East Pakistan. A war broke out, in which thousands of Bengalis were killed and millions fled into India. After India intervened West Pakistan was defeated, and in December 1971 the new state of Bangladesh was created.

Shaikh Mujib ur-Rahman (1920–75), leader of the Awami League, became the first prime minister of Bangladesh. He failed to establish political stability or prosperity in the turbulent new republic and was assassinated in a coup in 1975. Two further coups took place before

#### NATIONAL DATA

<b>Land area</b>	143,998 sq km (55,598 sq mi)			
<b>Climate</b>	<b>Altitude</b> m (ft)	<b>Temperatures</b>		<b>Annual precipitation</b> mm (in)
		<b>January</b> °C (°F)	<b>July</b> °C (°F)	
Dhaka	8 (26)	19 (66)	29 (84)	2,025 (79.7)
<b>Major physical feature</b> longest river Brahmaputra (part) 2,900 km (1,800 mi)				
<b>Population</b> (1990) 115,593,000				
<b>Form of government</b> multiparty republic with one legislative house				
<b>Armed forces</b> army 93,000; navy 7,500; air force 6,000				
<b>Largest cities</b> Dhaka (capital – 4,770,000); Chittagong (1,840,000); Khulna (860,000); Rajshahi (430,000); Narayanganj (298,000)				
<b>Official language</b> Bengali				
<b>Ethnic composition</b> Bengali 97.7%; Bihari 1.3%; others 1.0%				
<b>Official religion</b> Islam				
<b>Religious affiliations</b> Muslim 86.6%; Hindu 12.1%; Buddhist 0.6%; Christian 0.3%; others 0.4%				
<b>Currency</b> 1 Bangladesh taka (Tk) = 100 paisa				
<b>Gross national product</b> (1989) US \$19,913 million				
<b>Gross domestic product</b> (per person 1990) US \$1,050				
<b>Life expectancy at birth</b> male 56.0 yr; female 56.0 yr				
<b>Major resources</b> agriculture/fisheries 37.8% GNP; mining/manufacturing 8.4% GNP; transportation/communications 10.8% GNP; services 21.9% GNP				



General Zia ur-Rahman (1936–81) eventually took power, introducing a new authoritarian regime. He too was assassinated in 1981. Martial law continued under Lieutenant-General Hossain Mohammad Ershad (b. 1930), but further political unrest and economic crises led to his downfall in 1990. The following year, after the country's first fully democratic elections, Begum Khaleda Zia (b. 1945), leader of the Bangladesh National Party and widow of Zia ur-Rahman, became the new prime minister.

### Government

Although the original constitution of Bangladesh established a parliamentary government under an elected prime minister and president, years of martial law disrupted this system. From 1975 until 1991 the president was also leader of the armed forces, and his party had an absolute majority. Opposition parties were grouped into the socialist Awami League and the center-right Bangladesh National Party. The presidential system has continued under the new regime, but presidents may not be elected for more than two consecutive five-year terms.

### People

The great majority of Bangladeshis are Muslim ethnic Bengalis. However, there is a significant Hindu minority, and the tribal people who inhabit the Chittagong Hill Tracts are mostly Buddhists. The official language is Bengali, but Bihari is also spoken by many.

Classical Indian culture, particularly music and dance, exists alongside Bengali culture, though Western entertainment – including cinema and sport – is increasingly popular.

### ECONOMY

Bangladesh is one of the world's poorest countries. Population pressure stretches its resources even in relatively untroubled periods, but periodic natural disasters, particularly flooding, can trigger famine and disease on an enormous scale. Most of the country's economic development greatly depends on foreign aid.

### Agriculture

Bangladesh has an essentially agrarian economy that is vulnerable to the vagaries of the climate; ruined harvests, drought and floods have brought frequent famines. However, efforts are being made to counter this problem by means of irrigation projects and economic planning. The



**High-density city** Pedestrians and cycle rickshaws throng a street in Dhaka, the Bangladeshi capital. Built on a low-lying and flood-prone site, on a tributary of the Ganges, Dhaka has almost five million people, many of whom live in squatter encampments.

principal crop is rice, followed by jute and tea; other crops include sugar cane, fruit, tobacco and a little wheat.

Fishing is also important; the Bay of Bengal is an excellent source of marine fish, while the rivers provide freshwater varieties. Less than 10 percent of the land is forested, but teak and bamboo are grown for commercial use.

### Industry

With only small quantities of oil, natural gas and coal, and few mineral resources, Bangladesh has found it difficult to implement the industrialization policy begun in 1947. The steel, chemical and textile industries depend on importing raw materials (bought with aid), highlighting the extreme difficulty of achieving self-sustaining growth. Of the industries using local raw materials, jute processing (making rope and other products) is the most important. Others include making paper from bamboo and processing animal hides. Cottage industries, including textiles, ceramics and cane furniture, also earn foreign currency.

### Transportation and communications

An extensive railroad network was built during the years of colonial rule, but

today the inland waterways are more important for transporting cargo. On the roads, few of which are surfaced, bullock- or buffalo-drawn carts are used. Cycle rickshaws and simple three-wheeled motor vehicles are the chief forms of transport in towns. The main seaport is at Chittagong on the southeast coast. Chittagong also has an airport and there is another in the capital, Dhaka.

Comparatively few people own a television or radio, but many have access to someone else's. All broadcasting is controlled by the state. By contrast, the press is privately owned.

### Welfare and education

Population pressure and poverty put an enormous strain on welfare services. Healthcare, education and family planning programs are provided by government and private agencies, though these tend to be unevenly spread; facilities are based in Dhaka and Chittagong in the east of the country, which benefits much more than the west. Even so, malnutrition is rife everywhere, and diseases such as cholera and malaria are common.

Many Bangladeshis cannot read or write, and literacy rates are especially low among women. The government provides five years of free, but not compulsory, primary education, but only about one-half of the country's children are able to attend. Secondary and higher education are available only to a minority.

# Maldives

REPUBLIC OF THE MALDIVES



Parts of the Maldives resemble an idyllic island paradise. The islands are crowned with rich forests of breadfruit and palm, and are ringed with sandy beaches and clear lagoons.

The Maldives were settled some time between 500 BC and 500 AD, probably by fishing people from India and Sri Lanka. The Maldivian language, Divehi, resembles Sinhalese, the majority language of Sri Lanka. Later Arab settlers introduced Islam, which is now the state religion.

The islands fell to the Portuguese in the 16th century. They then became a sultanate under Dutch protection, and in 1796 they became a British protectorate. In 1953 a republic was declared, but the president was soon deposed and the monarch restored. The Maldives attained full independence in 1965. In 1988 there was a coup attempt resulting from instability in neighboring Sri Lanka.

The Republic of the Maldives is among the world's poorest nations, though some sectors of the economy, notably tourism, are growing. Agriculture is mainly at subsistence level. Crops include millet, cassava and yams, and coconuts are gathered for food and copra. Fishing, mainly for tuna and bonito, is the tradi-

**The idyllic atolls** of the Maldives lie scattered about the Indian Ocean. At the center of many of them lies a small island – sometimes inhabited, sometimes not – surrounded by a pellucid blue lagoon and enclosed by a reef. For many travelers they are paradise incarnate.

THE INDIAN SUBCONTINENT

## NATIONAL DATA

<b>Land area</b>	298 sq km (115 sq mi)			
<b>Climate</b>	<b>Altitude</b> m (ft)	<b>Temperatures</b>		<b>Annual</b>
		<b>January</b> °C (°F)	<b>July</b> °C (°F)	<b>precipitation</b> mm (in)
Male	1 (3)	27 (81)	27 (81)	1,500 (59.0)
<b>Population</b>	(1990) 215,000			
<b>Form of government</b>	nonparty republic with one legislative house			
<b>Armed forces</b>	army 900			
<b>Capital city</b>	Male (46,000)			
<b>Official language</b>	Divehi			
<b>Ethnic composition</b>	mixed (mainly Sinhalese)			
<b>Official religion</b>	Islam			
<b>Religious affiliations</b>	Sunni Muslim 100.0%			
<b>Currency</b>	1 Maldivian rufiyaa (Rf) = 100 laari			
<b>Gross national product</b>	(1989) US \$87 million			
<b>Gross domestic product</b>	(per person 1989) US \$670			
<b>Life expectancy at birth</b>	male 66.0 yr, female 64.1 yr			
<b>Major resources</b>	agriculture/fisheries 24.2% GNP, mining 1.8% GNP, manufacturing 5.7% GNP, trade 17.2% GNP, services 24.1% GNP			

tional mainstay of the islands' economy.

Vital imports, chiefly from India, include food (especially rice), manufactured goods and fuel for energy. Transportation is mainly by boat, but air travel is increasing. Religious and secular schools provide elementary education, and some secondary education is available on the islands. Healthcare still relies largely on traditional medicine.





# Sri Lanka

DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA



**S**RI LANKA IS AN ISLAND-STATE IN THE INDIAN Ocean off the southeast coast of India. The island is known for its great natural beauty and was once a popular resort for tourists, but in recent years it has been torn by ethnic violence.

## ENVIRONMENT

A narrow strip of shallow water – the Palk Strait – separates Sri Lanka from the southeast coast of the Indian peninsula. Sri Lanka once formed part of an ancient landmass and its rock formations are some of the oldest in the world.

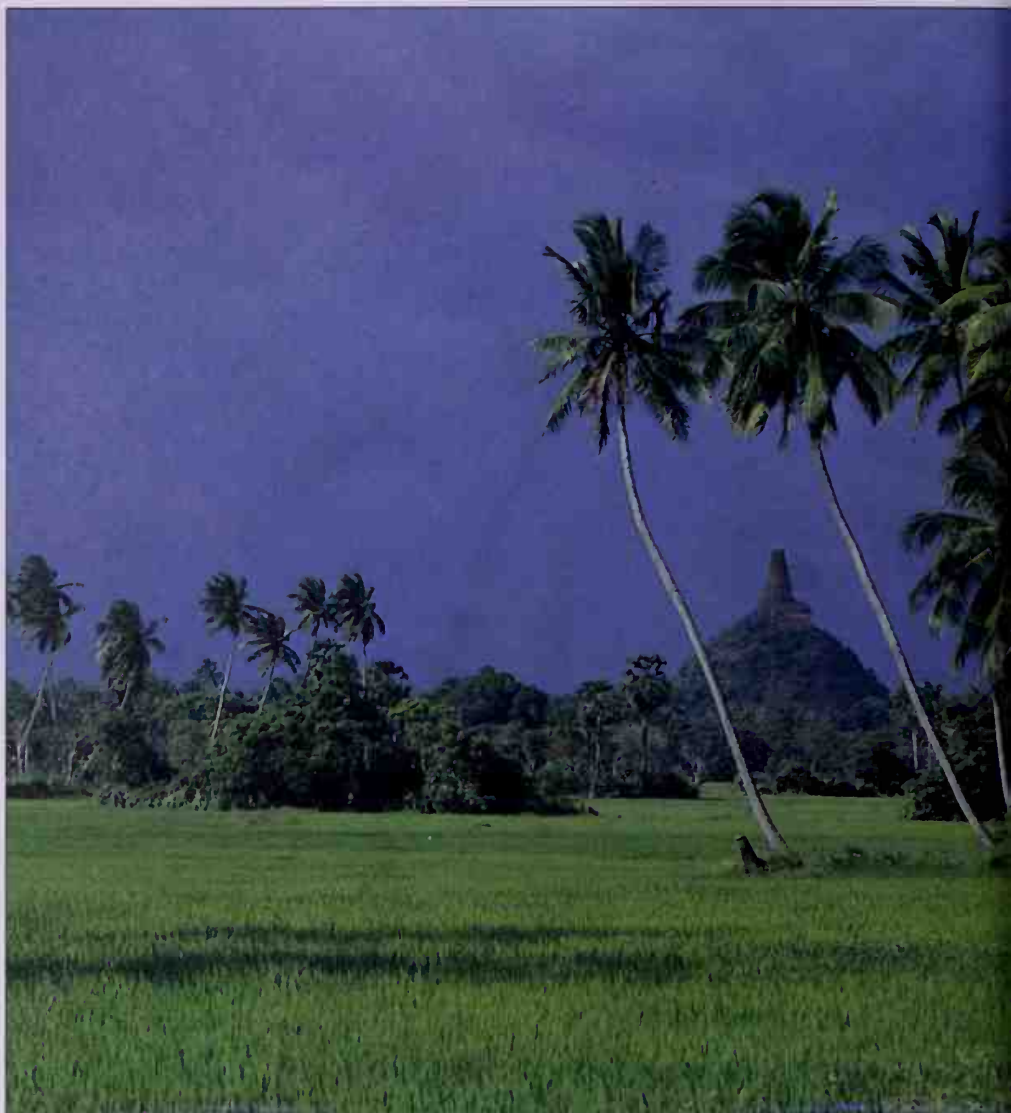
### The land

The landscape is dominated by the central mountainous region, rising to the highest point near the middle of the island at Pidurutalagala 2,518 m (8,261 ft) above sea level. The central massif, cut by gorges and deep valleys, includes the site of the former mountain capital, Kandy, with its distinctive lake and ancient temples. Many small rivers radiate from the highlands, tumbling in waterfalls down onto the plains below. To the west of the island is the pyramid-shaped Adam's Peak, a place of pilgrimage for Buddhists, Hindus and Muslims alike because of a large "footprint" on the summit that is believed to have been left by Buddha, the Hindu god Siva or biblical Adam (the first man).

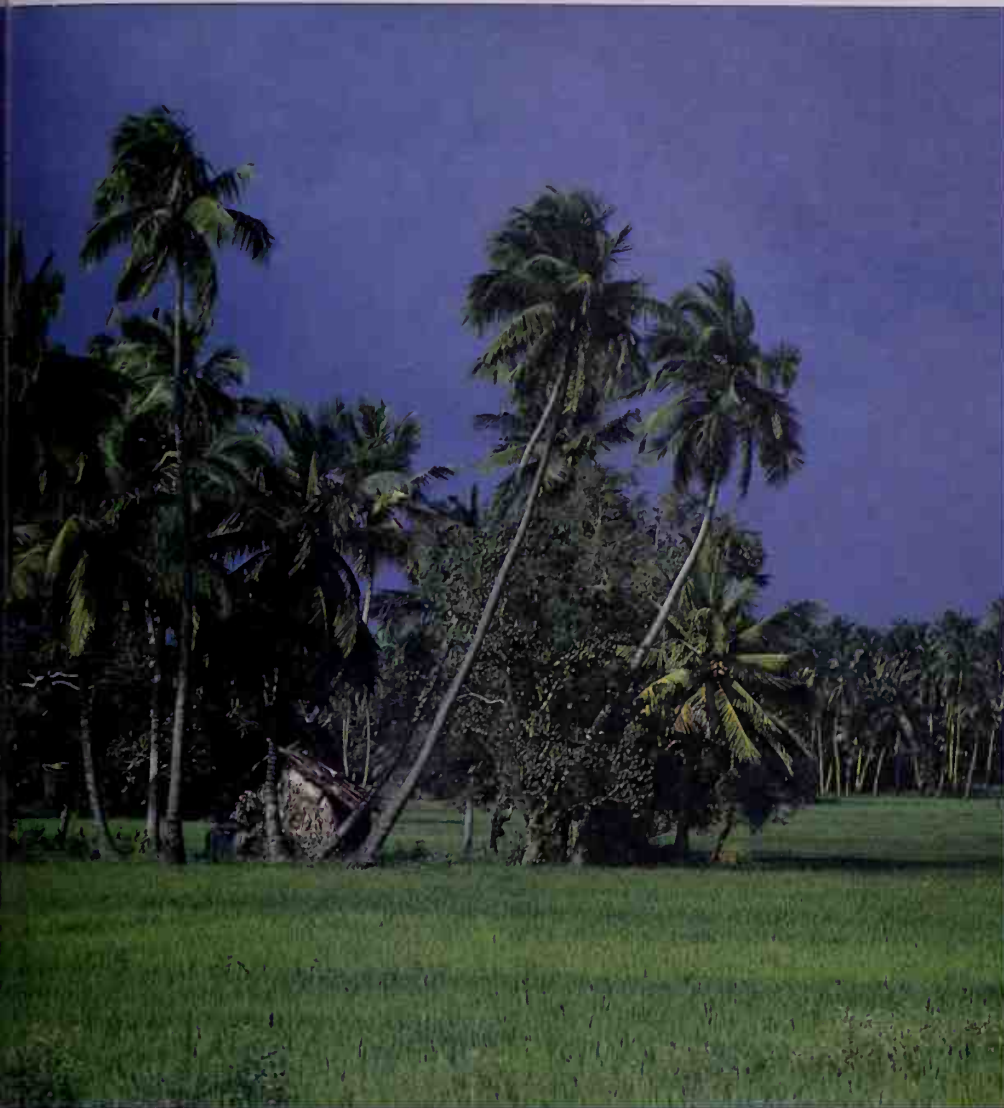
The rest of the country is mainly low-lying, interrupted by steep ridges and by *inselbergs*, ancient eroded blocks of stone. The coastline is partly fringed with coral islands and lagoons, especially in the far northwest around the Jaffna Peninsula and Mannar Island.

### Climate

Being close to the Equator, Sri Lanka is hot and humid throughout the year, though it is cooler in the mountains.







**Tropical palm trees** (above) rising from the long grass are a striking feature of the landscape around Anuradhapura in north-central Sri Lanka. This lowland region is cut by several rivers that rise from the central highlands where they are fed by heavy rains.

**Tea plantations and forest scrub** (left) on the central highlands near Sri Lanka's former capital, Kandy. Sri Lanka's natural forests are dwindling rapidly: in the southwest almost all the rainforest has been cleared for rice, coconut, tea or teak plantations.

Because of its position the island is affected by the Indian monsoon winds, and rainfall patterns vary accordingly. The summer monsoon blows from the southwest between May and October, bringing rain to most of the island. Rainfall is heavy in the southwest and in the highlands of the interior, but sparse in the far north and east. In the autumn the winds gradually switch round to the northeast, with heavier rain in some northern and eastern districts as the drier season approaches.

The monsoon is often unreliable, and severe droughts followed by floods are not uncommon. In some parts of the island agriculture is dependent on irrigation systems, such as that of the Mahaweli Ganga river in the east.

### Plants and animals

Sri Lanka was once completely covered in forest, but much of this has been cleared for cultivation, leaving open grassland, especially in the eastern lowlands. The wettest areas support rich rainforests, while drier parts have hardier monsoon forests, including valuable trees such as ebony and satinwood. Palms and mangrove swamps occur along the coast.

The island was once famous for its elephants, but their population has now fallen to only a few hundred. Other typical wildlife includes leopards, bears, jackals, wild pigs and monkeys.

### SOCIETY

Sri Lankan society has been influenced both by neighboring India and by its European colonizers, but throughout its history it has retained its own religious faith and strong cultural identity.

### History

In about the 5th century BC the island was settled by the Sinhalese people who arrived from northern India. They were converted to Buddhism by missionaries

from India two centuries later. The Sinhalese rulers established their authority throughout the island, which remained a Buddhist kingdom until 1200 AD. Over the following few centuries Sinhalese influence waned, and was confined largely to the southwest, while Tamils from southern India founded a Hindu kingdom in the north.

In the early 16th century the island was invaded and colonized by the Portuguese. They introduced Roman Catholicism, and imposed their own language and culture. However, the Sinhalese managed to maintain an independent mountain kingdom around Kandy. The Portuguese were ousted by Dutch traders in the mid 17th century, and in 1796 the island, which Europeans called Ceylon, became a British colony. The British built a network of roads and railroads, established a plantation economy (growing first coffee and then tea), and made English the official language.

From about the beginning of the 20th century a strong nationalist movement evolved, uniting Sinhalese and Tamils. Ceylon achieved dominion status at the same time as India in 1947, and was governed by the United National Party (UNP). In the 1956 elections the UNP was defeated by the Sinhalese nationalist Sri Lanka Freedom Party (SLFP), whose

### NATIONAL DATA

<b>Land area</b>	65,610 sq km (25,332 sq mi)			
<b>Climate</b>	<b>Altitude</b> m (ft)	<b>Temperatures</b>		<b>Annual</b>
		<b>January</b> °C(°F)	<b>July</b> °C(°F)	<b>precipitation</b> mm (in)
Colombo	7 (23)	27 (81)	27 (81)	2,527 (99.5)
<b>Major physical features</b> highest point: Pidurutalagala 2,518 m (8,261 ft); longest river: Mahaweli 329 km (206 mi)				
<b>Population</b> (1990) 17,217,000				
<b>Form of government</b> multiparty republic with one legislative house				
<b>Armed forces</b> army 70,000; navy 8,500; air force 10,000				
<b>Largest cities</b> Colombo (capital - 1,412,000); Moratuwa (143,000); Jaffna (138,000); Kandy (107,000)				
<b>Official languages</b> Sinhalese, Tamil				
<b>Ethnic composition</b> Sinhalese 74.0%; Tamil 18.2%; Sri Lankan Moor 7.1%; others 0.7%				
<b>Official religion</b> none				
<b>Religious affiliations</b> Buddhist 69.3%; Hindu 15.5%; Muslim 7.6%; Christian 7.5%; others 0.1%				
<b>Currency</b> 1 Sri Lanka rupee (SL Re, plural SL Rs) = 100 cents				
<b>Gross national product</b> (1989) US \$7,268 million				
<b>Gross domestic product</b> (per person 1990) US \$2,370				
<b>Life expectancy at birth</b> male 68.7 yr; female 72.9 yr				
<b>Major resources</b> agriculture/fisheries 26.3% GNP; mining 2.4% GNP; manufacturing 14.8% GNP; trade 21.3% GNP; transportation/communications 9.9% GNP				



leader, Solomon Bandaranaike (1899–1959) was later assassinated. His widow Sirimavo Bandaranaike (b. 1916) stood for election and in 1960 became the world's first woman prime minister.

Meanwhile resentment grew within the Tamil minority, who accused the SLFP of promoting Sinhalese culture at the expense of the Tamils. In 1965 a pro-Western UNP government regained power, but was subsequently defeated by a coalition of the SLFP and various left-wing groups. Ceylon became the Republic of Sri Lanka in 1972, when prime minister Bandaranaike introduced new social reforms and extended the nationalization program. However, none of these measures could prevent economic decline. Five years later the UNP returned to power under the leadership of Junius Richard Jayawardene (b. 1906), who established a new presidential constitution.

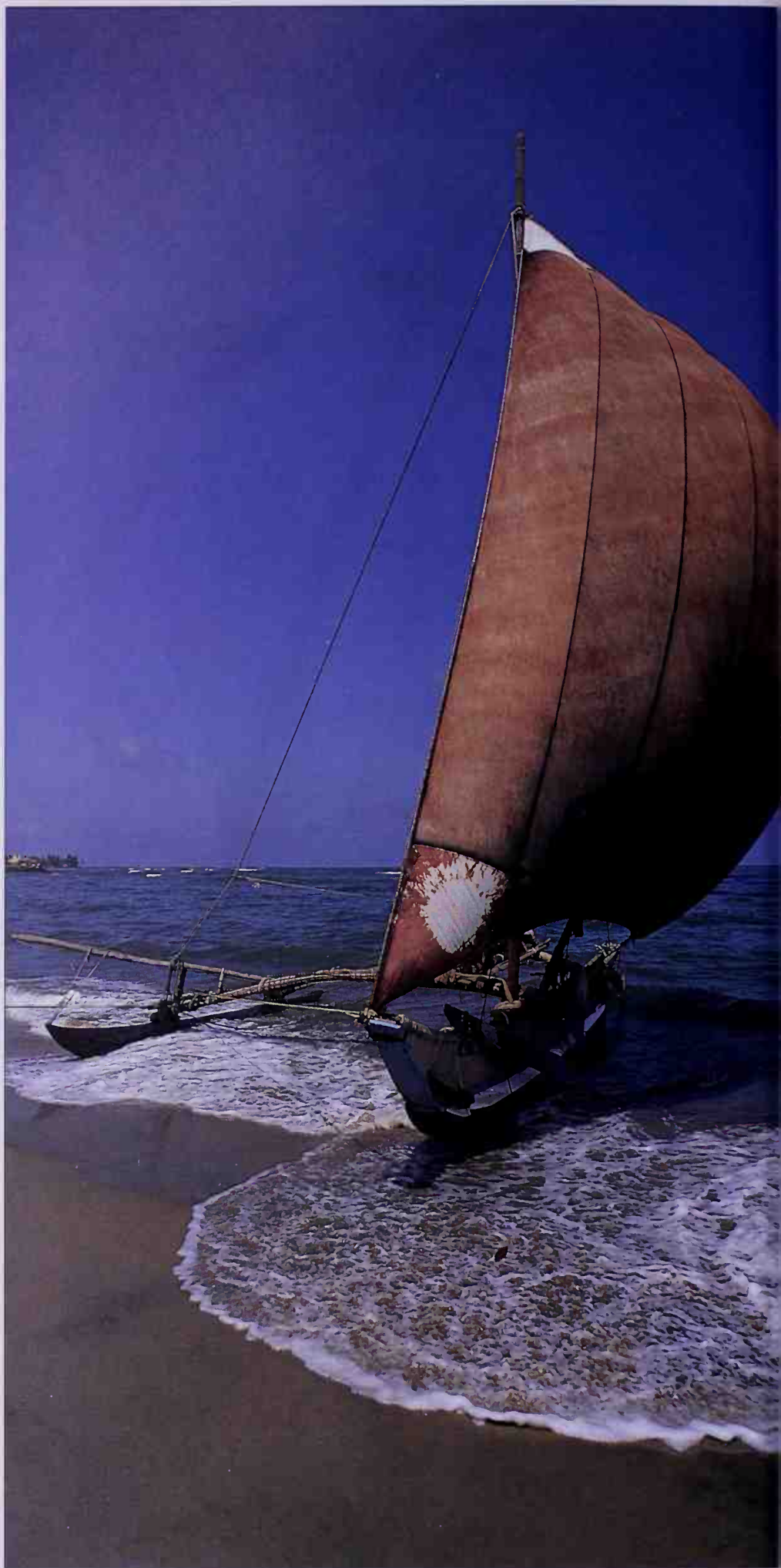
Throughout the 1980s Tamil opposition to Sinhalese domination increased. The separatist movement gained strength, and Tamil groups began to fight for an independent homeland in the north and east of the island. Anti-Tamil Sinhalese factions arose too, and there were many episodes of fierce fighting between rival ethnic groups and acts of terrorism on both sides. The government asked India to send in a peacekeeping force in 1987, but this alienated the Tamil community even further and the force was withdrawn in 1990. Ranasinghe Premadasa (1924–93) succeeded Jayawardene as president in 1989, after elections in which Indian troops were used to protect candidates in the north. Violence continued into the 1990s amid demands for a separate Tamil state, and in 1993 Premadasa was assassinated by a suicide-bomber.

#### Government

Sri Lanka is an independent republic within the British Commonwealth. The 1978 constitution established a presidential system in which the head of state is directly elected for a six-year term. The president has the power to appoint the prime minister and other ministers, and to dissolve the 168-member national assembly. Members of the assembly also serve for six years, and are directly elected by proportional representation. The island is divided into districts administered by a governor and an elected council.

#### People

The majority of the population are ethnic Sinhalese, but Tamils form a significant minority. Both Sinhalese and Tamil com-



# Dependencies in the region

## BRITISH INDIAN OCEAN TERRITORY UNITED KINGDOM

The British Indian Ocean Territory is a tiny oceanic colony whose strategic military importance is out of all proportion to its size. It consists of a group of islets in the center of the Indian Ocean some 1,600 km (1,000 mi) from southern India and about 600 km (nearly 400 mi) due south of the Maldives.

Like the Maldives, the islands are coral atolls formed around the summits of submerged volcanic mountains. Most are uninhabited, and even the largest and best-known of them, Diego Garcia – first discovered by the Portuguese in the 16th century – occupies only 27 sq km (10 sq mi). The climate on the islands is both warm and humid, and the natural vegetation consists primarily of coconut palms, which until the 1970s provided the only economic resource.

In 1965 the British Indian Ocean Territory was created from the amalgamation of the Aldabra Islands, and the Farquhar and Desroches islands (all purchased from the Seychelles), and the Chagos Archipelago, formerly a dependent of Mauritius. In 1976 the Seychellois territories were returned, leaving only the Chagos islands, including Diego Garcia, within the colony. The entire population of Diego Garcia, most of whom were migrants who had come to work on the copra plantations, was relocated to Mauritius to clear the way for the construction of a major support and refueling station for British and United States' armed forces. Today there is no permanent civilian population on the islands, only military personnel.



**A United States' aircraft carrier** moored at the American naval base on Britain's Diego Garcia. Built in the 1970s, the base provoked strong opposition from countries surrounding the Indian Ocean who wished to keep the region a nonmilitarized zone

new crops. However, plantation crops – principally tea, rubber and coconuts – are still the mainstay of the export market. The chief subsistence crop is rice, though harvests still fall short of the country's needs. Fruit, vegetables and spices are grown as staples and for export, and there is some livestock farming. Sea and coastal fishing are important, but pearl fishing has lost the significance it once had. Reforestation schemes produce timber mainly for domestic use.

### Industry

Having no petroleum or coal of its own, the island depends on hydroelectric power and imported oil to generate electricity. Graphite (used in nuclear reactors as well as in pencils) is a major export. Other mineral resources include iron ore, kaolin and gemstones; some salt is extracted from coastal lagoons. Cement manufacturing and the construction industry draw on the limestone from the north of the island. Textiles, leather and paper are also made on the island.

Tourism is another potential revenue-earner. The island's beautiful coastal and mountain scenery are tourist attractions, and hotel development in seaside and highland resorts has been encouraged by the government, but the industry has suffered badly during the civil war.

### Transportation and communications

Sri Lanka has extensive road and railroad networks, though both vary in quality. The principal port is Colombo, on the west coast; Trincomalee in the northeast handles much of the export trade in tea. Air Ceylon, the national carrier, operates internal and international flights from the main airport near Colombo.

Radio broadcasts in Sinhalese, Tamil and English are popular, and television ownership is growing. Daily newspapers have a relatively low circulation.

### Welfare and education

The state provides a comprehensive social welfare program, covering benefits for unemployment, disability and old age. Despite a government housing program, however, there is still a shortage of urban housing, particularly in Colombo. Medical care is provided free of charge, but malnutrition and disease are both widespread, and the hospitals are short of trained medical personnel.

Education, compulsory up to the age of 13, is free and literacy rates are high. The number of secondary school students going into higher education is increasing.

## ECONOMY

Sri Lanka has a mixed economy. Although programs of land-reform have brought much agricultural production under state control, private industrial development is also encouraged. The country faces continuing economic problems, partly as a result of the civil war.

### Agriculture

In recent decades agricultural yields have risen because of improved irrigation and management, and experimentation with



**Garish and pop-eyed** (above), this "devil's mask" is worn during an annual Sri Lankan dance-drama, a throwback to a belief in devil spirits that existed in pre-Buddhist times. Sri Lankans have retained a rich cultural heritage, despite Western and Indian influence.

**Beached on the sand**, a Sri Lankan outrigger boat used for fishing in the open sea. Fishing – both coastal and particularly deep sea – is of considerable importance to the local economy, providing not only jobs, but an important addition to the diet.

munities have a caste system similar to that of India. Communities are also divided into lowland and up-country (Kandy) Sinhalese, and Sri Lankan and Indian Tamils. Other minorities include Sri Lankan Moors (Tamil-speakers, partly of Arab descent) much smaller groups of Burghers (mixed Dutch and Eurasian), Europeans and Malays.

Religious affiliation generally follows ethnic lines. The Sinhalese are Buddhists, the Tamils are Hindus, and the Sri Lankan Moors practice Islam. However, there are also some Christians within most ethnic groups. The Tamil language now has some official recognition alongside Sinhalese, and English is widely spoken.

Traditional culture is based on Buddhist and Hindu art, dance and drama. The government strongly encourages the revival of these native art forms in opposition to the tendency to adopt modern Western and Indian culture.



# The Indian Subcontinent

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Hindu faithful on the banks of the  
Ganges at Varanasi, India







# PHYSICAL GEOGRAPHY

THE MAKING OF A SUBCONTINENT · LAND OF THE MONSOON · THE LIFELINE OF INDIA

The pendant shape of India projects south from Asia into the Indian Ocean. The subcontinent extends some 5,600 km (3,500 mi) between the snowcapped Himalayas in the north and the island of Sri Lanka in the south, and from the barren deserts in the west to the wet jungles in the east. Some of the oldest rocks in the world are found on the tapering peninsula, while the Himalayas, the world's highest mountains, are still being lifted up. Between the two, the fertile plains and deltas of the great Brahmaputra, Ganges and Indus rivers support one of the world's chief concentrations of people. Climates range from glacial to tropical, and the influence of the seasonal wet monsoon winds reaches almost everywhere. Vegetation also varies greatly, from tropical rainforests to alpine plant communities.

## COUNTRIES IN THE REGION

Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

## LAND

**Area** 4,476,064 sq km (1,727,276 sq mi)

**Highest point** Mount Everest, 8,848 m (29,028 ft), highest on Earth

**Lowest point** sea level

**Major features** Himalayas, world's highest mountain range, plains and deltas in north, Thar Desert, Deccan plateau

## WATER

**Longest river** Brahmaputra and Indus both 2,900 km (1,800 mi)

**Largest basin** Ganges, 1,059,000 sq km (409,000 sq mi)

**Highest average flow** Brahmaputra, 19,200 cu m/sec (678,000 cu ft/sec)

**Largest lake** Manchhar, Pakistan, 260 sq km (100 sq mi); reservoirs in India are larger

## CLIMATE

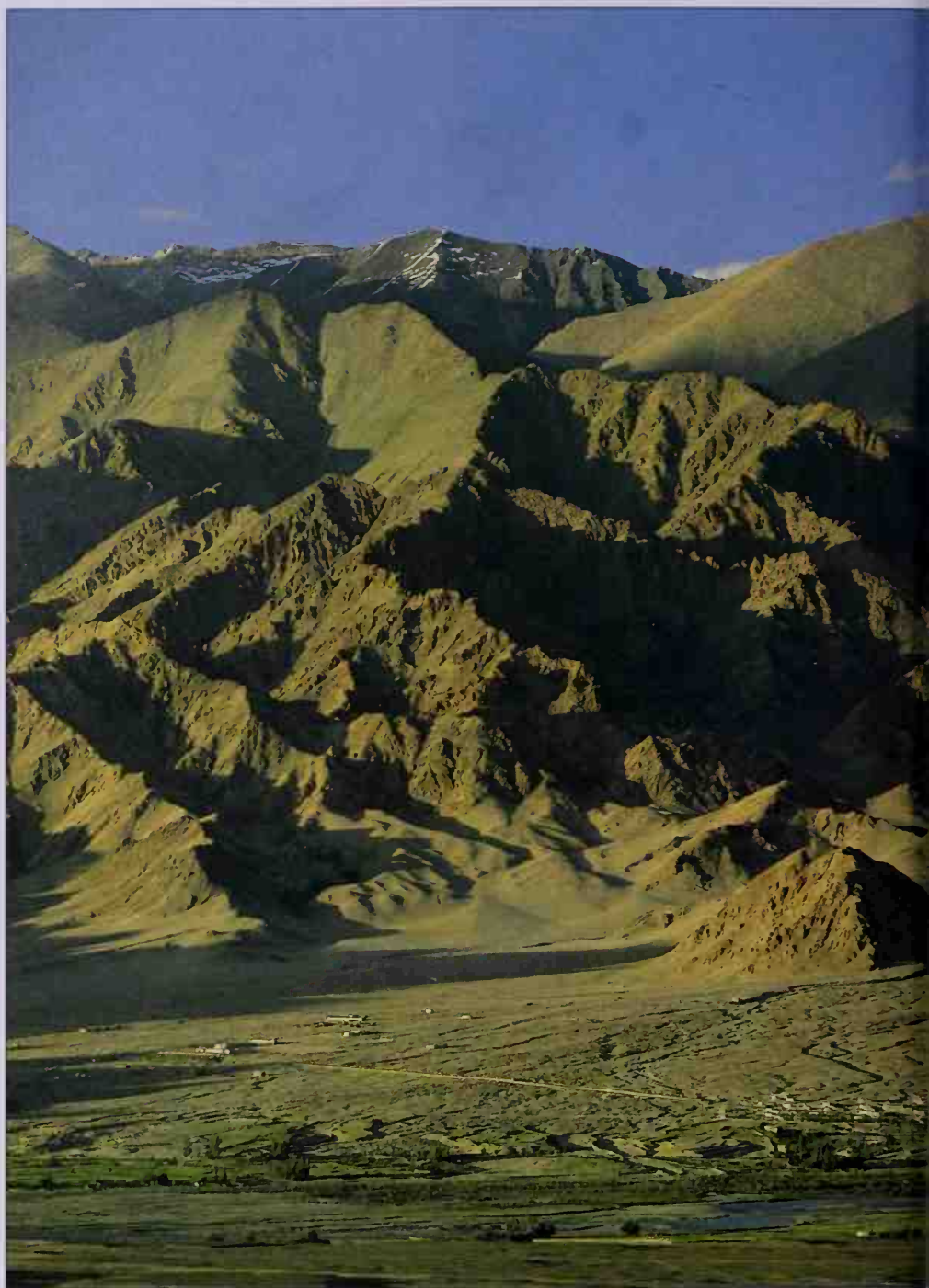
	Temperature °C (°F)		Altitude m (ft)
	January	July	
Jacobabad	15 (59)	39 (95)	56 (184)
Simla	19 (66)	5 (41)	2,205 (7,232)
New Delhi	14 (57)	32 (90)	216 (708)
Kathmandu	10 (50)	24 (75)	1,334 (4,376)
Chittagong	20 (68)	28 (82)	14 (46)
Trincomalee	26 (79)	30 (86)	3 (10)

	Precipitation mm (in)		Year
	January	July	
Jacobabad	7 (0.3)	27 (1.0)	88 (3.5)
Simla	61 (2.4)	424 (16.7)	1,577 (62.1)
New Delhi	25 (1.0)	211 (8.3)	715 (28.2)
Kathmandu	19 (0.8)	378 (14.9)	1,328 (52.3)
Chittagong	10 (0.4)	642 (25.3)	2,858 (112.5)
Trincomalee	211 (8.3)	54 (2.1)	1,727 (68.0)

World's highest recorded annual rainfall, 26,470 mm (1,042.1 in), Cherrapunji, northeast India

## NATURAL HAZARDS

Cyclones, storm surges, flooding of great river deltas



## THE MAKING OF A SUBCONTINENT

There are three major structural elements to the subcontinent of India. In the south is the ancient and stable triangular mass of peninsular India, in the north the geologically young folds of the Himalayan mountain chain. Between them lie depressions now filled with sediments deposited by the great Brahmaputra, Ganges and Indus rivers.

High in the western Himalayas, the waters in the upper reaches of the Indus valley flow past the mountains at an altitude of 3505 m (11,500 ft). The river, fed by streams formed by melting snows, erodes the mountains to give steep, V-shaped valleys.

The plateau of peninsular India (the Deccan) and Sri Lanka once formed part of the ancient landmass called Gondwanaland, which moved north until it collided with the Asian landmass. Hard, resistant granites over 600 million years old are widespread in this ancient shield area, as are gneisses, granite which has





the third and youngest part of the subcontinent's structure – the floodplains and deltas of the Brahmaputra, Ganges and Indus. The floor of these vast plains is made of sediments brought down from the Himalayas, and to a lesser extent from the north of the Deccan plateau. Once well-watered parts of these alluvial plains have become very arid: in the Thar or Great Indian Desert there are abandoned river channels as well as sand dunes and other desert landforms.

Deltas form where rivers deposit sediment more quickly than it can be removed by the sea. In the northeast of the Indian subcontinent this process takes place on a grander scale than anywhere else on Earth. Almost the entire country of Bangladesh is included in the combined delta of the Brahmaputra, Ganges and other rivers. The delta is the world's largest, covering about 60,000 sq km (23,000 sq mi).

The deposits that form the delta also extend hundreds of kilometers out below sea level into the Bay of Bengal and as far south as Sri Lanka. At times during the past 2 million years, when glaciers covered larger areas of the Himalayas than at present and the sea level was lower, the Brahmaputra and Ganges poured sediment brought from the Himalayas down to positions that are now far out into the ocean.

In contrast to the dramatic relief of most of the subcontinent, the coral atolls of the Indian Ocean – the Lakshadweep, Maldivian, Andaman and Nicobar groups – have very little relief. The highest land on the 2,000 islands of the Maldives is only 2 m (6.6 ft) above the level of the sea.

been metamorphosed under great heat and pressure. There are also other less intensively altered but still ancient sedimentary rocks. A typical landscape is one of plateaus, with more resistant blocks rising abruptly above them. An isolated plateau that includes the Khasi Hills in northeastern India is an extension of this.

There are younger, yet still very ancient, sedimentary rocks in dips or basins within the older structures. These form both gently rolling plateaus and spectacular scarplands, particularly along the northern edge of the Deccan, where they are cut by waterfalls. Much younger sediments exist in long depressions, particularly in the east of the peninsula, which is fringed by a coastal plain and a series of deltas formed by sediment that has been washed down from the plateaus.

The west of peninsular India is covered by volcanic lavas that reach an immense thickness of up to 3,000 m (10,000 ft) toward the coast. This lava plateau has

been tilted toward the east; the gentle slopes facing east contrast with the steep scarp of the Western Ghats, which faces the Arabian Sea.

### The Himalayas

The mountains of the Himalayas began to form about 40 million years ago, when the slowly drifting crustal plate of India collided with that of Eurasia. The Himalayas are the world's highest mountain system, with an average height of about 6,000 m (19,000 ft). Major rivers, such as the Brahmaputra, that originally flowed south from the region of Tibet were diverted by the rising land, then cut down to the south as the land was raised, and now cross the Himalayas in spectacular gorges. River basins and ranges were formed, notably in the far north, as well as remote plateau areas such as the Ladakh Range.

### Plains, deserts, deltas and atolls

Between the mountains of the north and the stable mass of peninsular India lies



## LAND OF THE MONSOON

Within the subcontinent of India are some of the hottest, coldest, driest and wettest parts of the world. In the north are the cold mountain ranges of the Himalayas, in the south the equable tropical atolls of the ocean, to the northwest the arid Thar Desert, and to the southeast the hot, humid rainforest of Sri Lanka. The pattern of relief dictated by geological history has been greatly modified by these different climates.

### Monsoon climates

The seasonal system of winds known as the monsoon dominates the climate of the subcontinent. Each year the change from predominantly offshore northeasterlies in winter to onshore southwesterlies in summer brings rain to most of the area from June to October. In winter air is drawn from the land toward a low pressure belt farther south, where the sun's heat is stronger. The Coriolis effect, caused by the Earth's rotation, swings the winds to the northeast. This gives onshore winds in the extreme southeast, which receives some rain in winter, unlike most of the rest of the subcontinent.

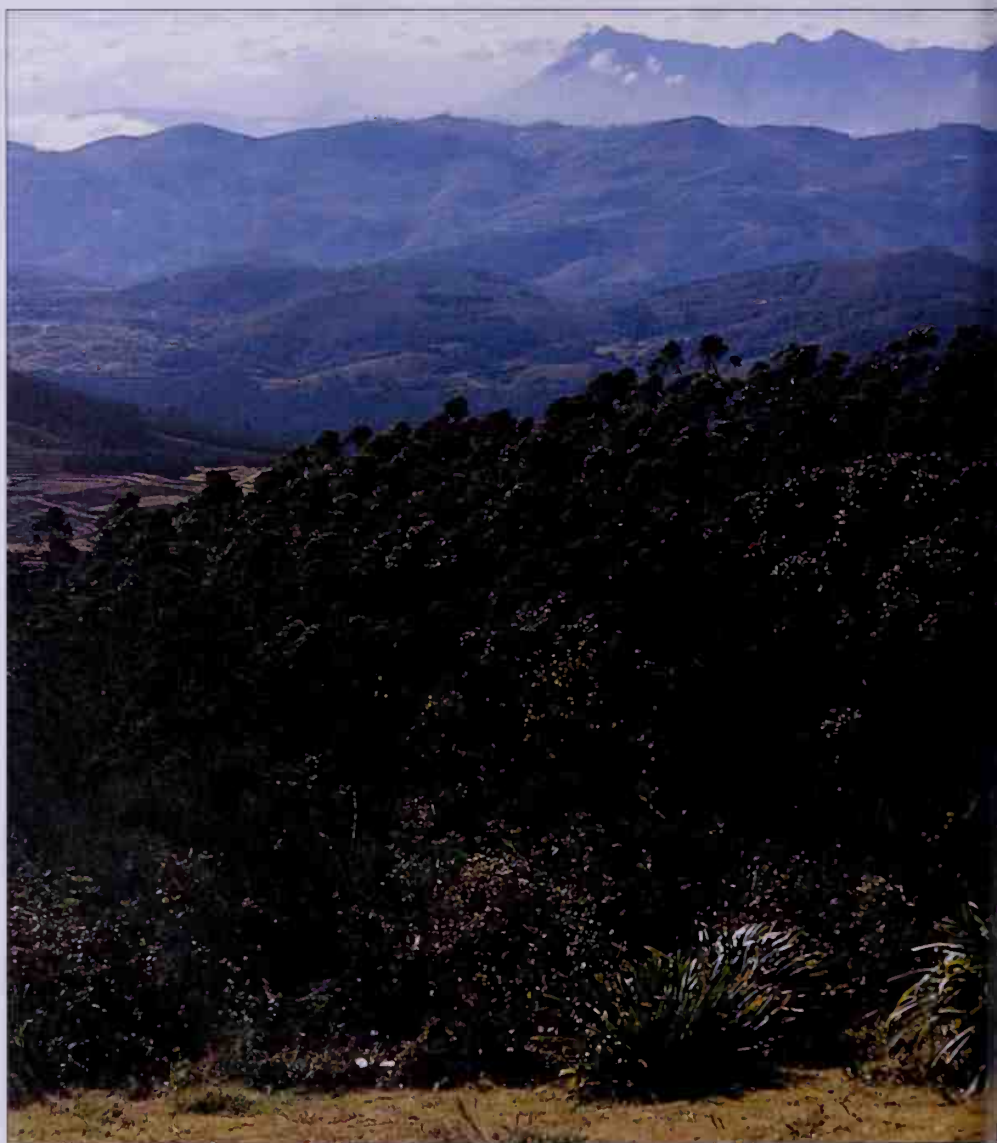
During spring and summer the land heats up more quickly than would be expected because the barrier of the Himalayas prevents cooler air from being drawn south. Moist air drawn in from the sea to replace rising air cools, condenses and falls as rain. The Coriolis effect causes these summer monsoon winds to converge. This effect is accentuated by relief: in northeast India there is very high rainfall – Cherrapunji holds the world record for annual rainfall.

The development of the monsoon is influenced by the strong westerly subtropical jet stream. During the summer this high-altitude wind migrates north of the Himalayas, allowing the moist winds to penetrate farther inland.

Superimposed upon this broad pattern is the effect of altitude, with barriers such as the Himalayas and the Western Ghats causing very high concentrations of rainfall and lower temperatures.

### Weathering and erosion

In the tropical south chemical weathering is the chief process by which the land surface is broken down. It is largely caused by the rainwater that percolates









## THE LIFELINE OF INDIA

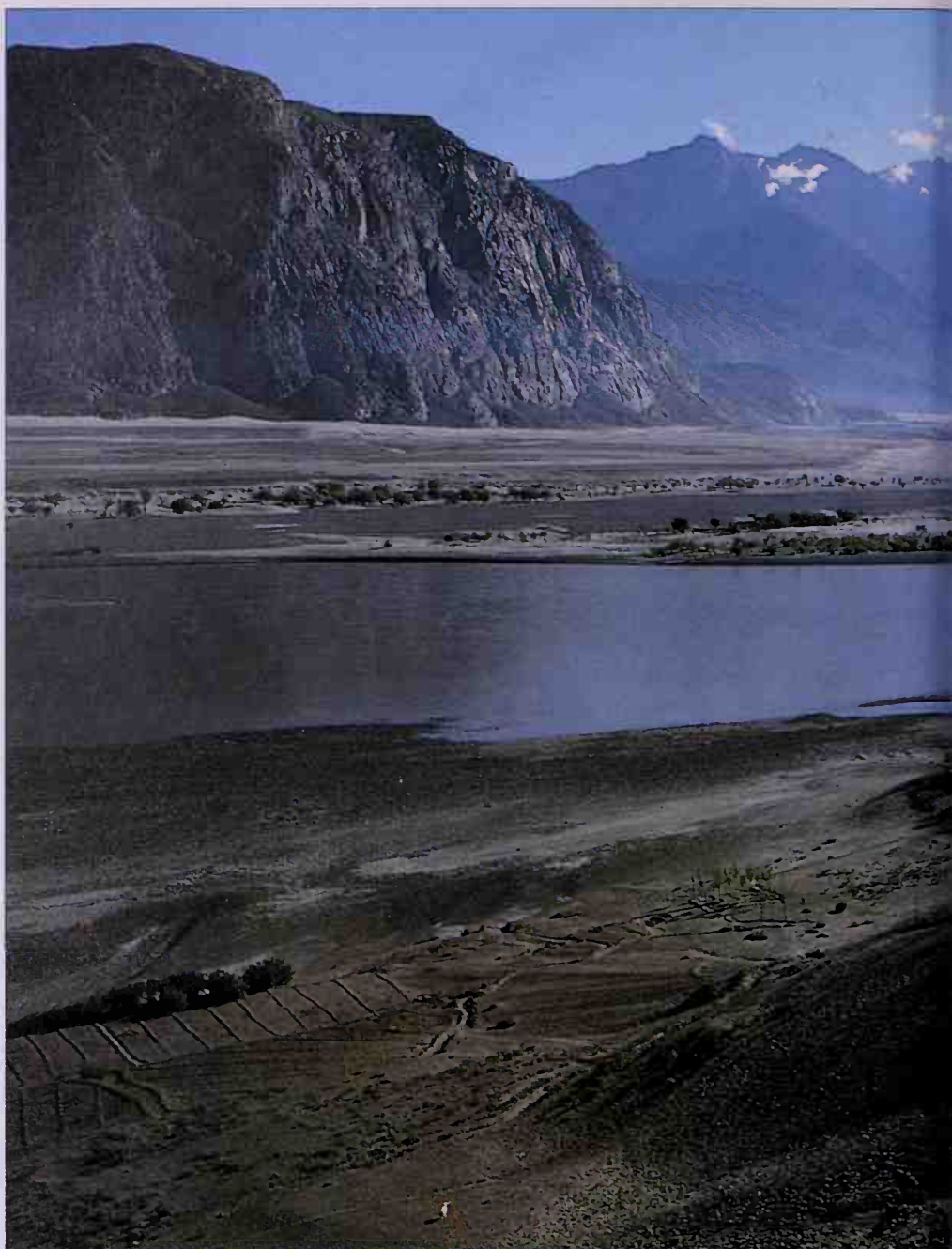
Rivers have an immense significance in the Indian subcontinent. They have carried down material eroded from the Himalayas and the Deccan plateau and deposited it over millions of years to create the great plains of northern India, one of the world's most fertile farming regions. As a populous agricultural area, the plain of the Ganges is second only to the Chang valley of China.

For thousands of years the rivers of the subcontinent have been used to irrigate large areas that would otherwise have been too dry for cultivation, and to provide the water supply for towns and villages. Today their waters also generate hydroelectricity. Culture and religion reflect this enduring importance. The Ganges is Mother of Life to the Hindus of India. Where its waters join those of the Yamuna at Allahabad up to 30 million people may gather to take a holy bath.

### River flow and rainfall

The catchment areas drained by these rivers are relatively small compared with those of some of the world's great river systems. From their sources in the Himalayas to their deltas, the Brahmaputra and Indus flow for about 2,900 km (1,800 mi), the Ganges for about 2,505 km (1,557 mi). They are easily surpassed in length by the rivers of other continents. However, their rate of flow matches that of some of the world's greatest rivers. The Brahmaputra has the seventh largest discharge in the world, and the Ganges, Indus, Godavari and Mahanadi (the last two from the plateaus of the peninsula) are all included in the top forty. The joint discharge of the Brahmaputra and Ganges into the Bay of Bengal is exceeded only by the Amazon in South America and the Congo in Central Africa.

Rainfall is concentrated into a fairly short season. As a result water runs off the surface of the land, as opposed to percolating through it, at a much higher rate than in more equable climates. The arrival of the monsoon rains, generally in June, has a dramatic effect on the rivers, with a concentration of flow into a very short time. In the most arid regions rivers may flow only immediately after sporadic rainfall. Rivers that in the dry season are a broad sandy channel with no more than a trickle of water can become an impassable



flood of water several kilometers wide during the monsoon season.

The regimes of the Ganges and Brahmaputra are very similar. There is a rapid rise to maximum flow in July–August, at the peak of the monsoon, and a low flow for the rest of the year. More than half the delta of Bangladesh is regularly flooded by rivers, and up to a third of it may be inundated each year to a depth of a meter (3.3 ft) or more.

### River landscapes

There are two reasons for the exceptional quantity of sediment carried by the rivers draining from the Himalayas. The height of the land, and the fact that it is still rising, means that rainfall is high and the process of erosion very active. By continuing to cut down into the rocks, rivers have created steep slopes that have frequent landslides. The second reason is

### GREAT RIVERS IN FLOOD

The annual flow of the Brahmaputra and Ganges through their combined delta is less than that of the Amazon or Congo. But allowing for their smaller drainage basins, they have a very high rate of flow, and they carry three times as much sediment for every square kilometer of watershed as the Huang, and twenty times as much as the Amazon.

River	Average annual flow	
	cu km	cu mi
Amazon, Brazil	3,768	902
Congo (Zaire), Congo/Zaire	1,256	301
Chang, China	688	165
Mississippi–Missouri, United States	566	133
Orinoco, Venezuela	538	129
Paraná, Argentina	493	118
Brahmaputra, India/Bangladesh	476	114
Indus, Pakistan	443	106
Irrawaddy, Burma	443	106
Ganges, India/Bangladesh	440	105





**Cutting through the mountains** The Indus river at Skardu, Pakistan. The low level of the water reveals the surrounding floodplain. On the right is a remnant of a higher floodplain, formed before the base level dropped and the Indus cut down again into the valley floor.

### LIVING ON A DELTA

Most of Bangladesh is delta, and over half of it is flooded every year during the summer monsoon season. In many countries flooding is regarded as a hazard, yet in delta regions it is part of normal landscape development. Deltas receive both the solid and the dissolved nutrients carried by rivers. They are consequently very fertile and often support a large human population – over 100 million in Bangladesh. Floods are therefore both a hazard and an asset.

A new danger is being caused by deforestation in the catchment areas of the Ganges and Brahmaputra, particularly in Nepal and the Indian Himalayas. In October 1988 three-quarters of Bangladesh was flooded for three weeks. These were the worst floods of the century, killing over 2,000 people. Thousands more died from disease and starvation, and 25 million people were made homeless. The waters destroyed perhaps a billion dollars worth of crops, 3,500 km (2,200 mi) of roads and 250 bridges.

The delta area is also subject to catastrophic storm surges. Cyclone winds up to 200 k/h (120 mph) whip up waves as much as 9 m (30 ft) high. Devastation and an enormous death toll may follow when a storm surge passes over the densely populated delta.

that deforestation, especially in Nepal, leaves the ground unprotected against the intense monsoon rains. Deforestation is now having a similar impact in river catchment areas along the northern side of the Deccan.

The Indian subcontinent has a rich variety of landscapes formed by rivers. Himalayan rivers flow through well-defined valleys, with frequent lake basins, before reaching the plains of northern India and Pakistan. Sandy alluvial fans are built out where rivers emerge from the Himalayan foothills and flow down onto the floodplains. Rivers flowing off the Deccan plateau produce spectacular gorges headed by waterfalls where the waters are cutting down into the basalt. In the dry season they can be completely dry, whereas in the wet season the roar of water can be heard 16 km (10 mi) away. In the desert regions

rivers flow infrequently, often ending in inland lake basins such as those in the northwest of India.

The great expanses of the northern plains are covered by a fertile layer of sandy deposits. Levees or mud banks are among the few natural features that break up the flatness of the land. They are formed in times of flood when the river deposits the coarser material in its load of sediment as it slows down on leaving the main channel. In the deltas of the Indus and Ganges–Brahmaputra, the rivers and distributaries into which they divide also flow above the general level of the land, their channels bounded by levees to either side. Beyond the levees the land slopes down into dips (backswamps) where finer-grained material is deposited during floods. The constant shifting of the river channels means that sandy deposits are widespread across the delta.



**The floodplain of the Ganges** in the state of Bihar, in northeast India. Monsoon rains and melting snow in the Himalayas swell the sacred river to bursting point, periodically causing catastrophic floods that are made worse by deforestation in the catchment area.



# Asia's giant mountain wall

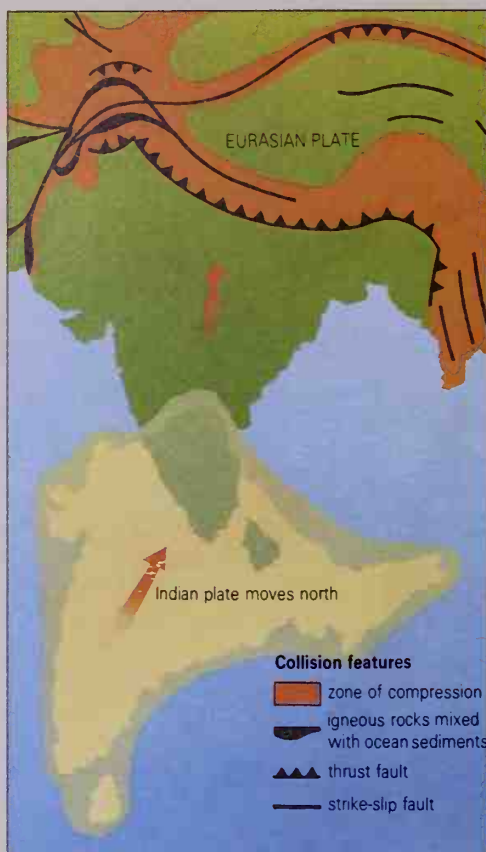
The name Himalayas is a Nepalese word meaning "home of the snows". This "home" is by far the greatest mountain system of the world. With an average height of about 6,000 m (19,000 ft), they stretch 2,500 km (1,550 mi) from the far north of the subcontinent through Pakistan, India, China, Nepal, Sikkim and Bhutan to the southern bend of the Brahmaputra river in the east. The system includes the world's highest mountain, Mount Everest (8,848 m/29,028 ft), which is still known by the name of a 19th-century British surveyor but also bears the Tibetan name Chomolungma. The third highest peak, Kanchenjunga (8,598 m/ 28,208 ft), is also to be found in the Himalayas; the second highest, K2, lies nearby to the northwest in the Karakoram Range. There are some thirty peaks higher than 7,620 m (25,000 ft) in the system, and nearly ninety of the hundred highest peaks in the world are to be found in the Himalayas; every one of them is more than 7,315 m (24,000 ft) high.

The Himalayas are in three parallel parts. In the north are the perpetually snow-covered Great Himalayas. This is where the highest mountains are to be found. Flanking them to the south are the Lesser Himalayas, which attain their greatest height at the western end of the range. Further south still, the Siwalik Range or Outer Himalayas are much lower, being below 1,000 m (3,300 ft). They are formed of coarse sandstone laid down as a result of erosion of the main Himalayas and subsequently cut through by rivers. Although much lower they are nonetheless very rugged. Between them and the Lesser Himalayas are scattered river basins, such as that of the Katmandu valley in Nepal.

A wide valley containing the headwaters of two of the subcontinent's great rivers runs along the northern edge of the Greater Himalayas. The Indus flows to the west in this east-west oriented furrow, the Brahmaputra flows to the east.

**Building the Himalayas** As the plate carrying the subcontinent of India moved toward the Eurasian plate, the shallow sea that separated them became smaller, and the oceanic crust was forced under the Eurasian plate to become part of the mantle again. A line of volcanoes was produced above the molten crust. The Indian subcontinent was pushed ever closer to the continent of Asia until the continents

themselves collided. The line of collision is marked by thrust faults in northern India. To the north of this the sedimentary rocks have been folded and faulted, pushing up to form the Himalayas and down to depress the mantle itself, making this the thickest part of the Earth's crust. Evidence of the scale of vertical movement is provided by the marine fossils to be found on the mountain peaks.



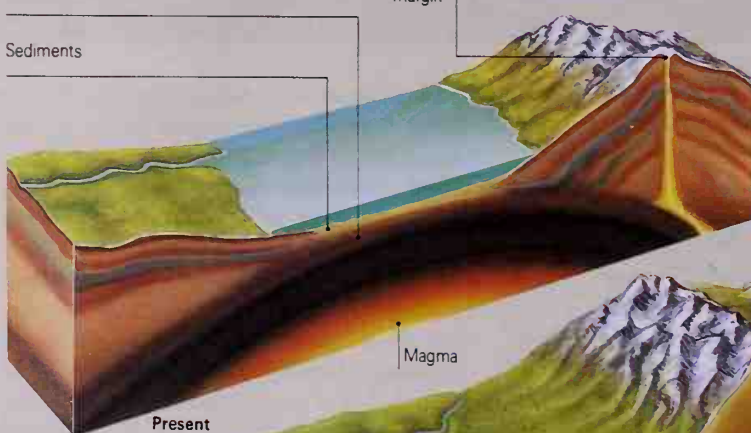
**Collision course** About 40 million years ago the Indian plate collided with the Eurasian plate, buckling the sediments between them. The collision is marked by long thrust faults and shorter strike-slip faults.

**40 million years ago**

Oceanic crust forced below Eurasian plate

Mountains are formed by volcanic activity at plate margin

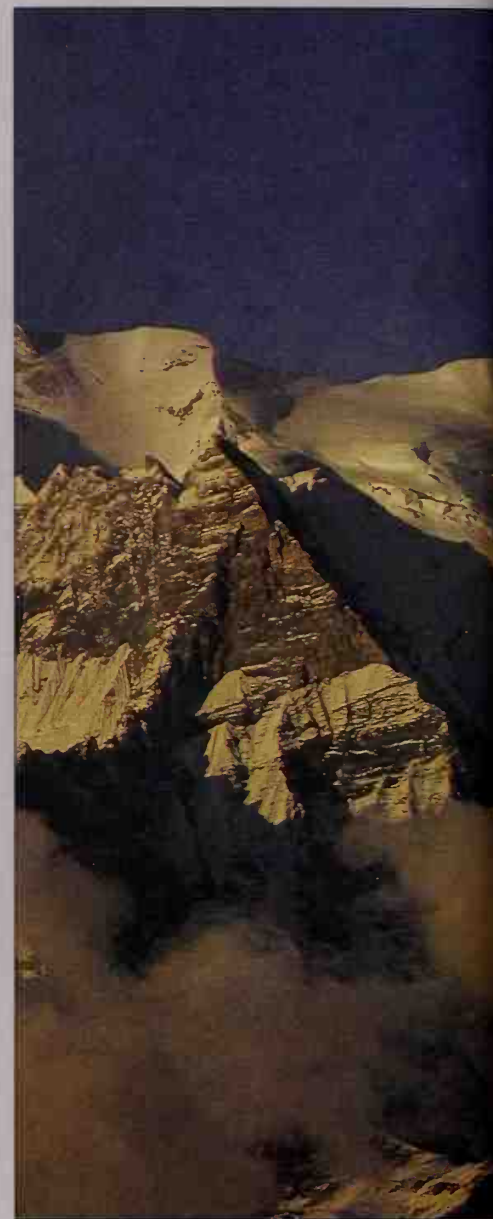
Sediments



Present



Ripple effect of collision forms mountains and Plateau of Tibet







**The peak of Annapurna** stands 8,078 m (26,504 ft) above sea level in the Great Himalayas. The Himalayan mountains are made of sedimentary rocks laid down in the sea and raised by earth movements; they still gain 1 m (3.3 ft) every 1,000 years.

### Growing ever higher

The colossal structure of the Himalayas is the result of a major event in the history of the Earth – the collision between two continents. The part of the Earth's crust that carries peninsular India became detached from the southern supercontinent of Gondwanaland when it broke up in the Cretaceous period (144–65 million years ago). It drifted slowly northeast away from Africa at a rate of about 1 km (0.6 mi) every 10,000 years. About 40 million years ago the Indian plate met the Eurasian plate, the rate of drifting was halved, and the ancient sedimentary rocks on the ocean floor between the two landmasses were pushed up to begin the formation of the Himalayas. As the mountains were thrust up over millions

of years, there were also massive dislocations, including faults with angles of less than 45° to the horizontal. Some of these reverse faults pushed great mountain blocks one over the other to distances of 50 km (30 mi) or more.

The oceanic crust beneath the Indian Ocean continued to spread, pushing the Indian plate still farther north. The Indian plate moved under the Eurasian plate, thickening the crust to 70–90 km (40–55 mi) beneath the Himalayas and Tibet to the north, thicker than anywhere else on Earth. In the past few million years the whole region of the Himalayas has risen some 3,000 m (10,000 ft), partly as a result of the deep crust floating upward on the underlying mantle to reach a new equilibrium (isostasy) and partly because India continues to push into Asia, though now at a slower rate of about 1 km (0.6 mi) per 100,000 years. Earthquakes regularly occur, providing proof that mountain-building is still going on.

Averaged over the whole area, every thousand years the land has been lifted some 2 m (6.6 ft), and has lost 1 m (3.3 ft) from the surface through erosion. This eroded material, carried down as sediment by the great rivers and deposited over the lowlands, has formed the plains and deltas of northern India, Bangladesh and Pakistan.

The raising of the great mountain wall has made the Himalayas a very effective climatic barrier, excluding the Indian monsoon winds and so preventing warm, moist air from moving to the north. The Plateau of Tibet is consequently one of the coldest and driest places on Earth. Because of the low rain- and snowfall, there are fewer glaciers on the northern slopes of the Himalayas. On the snow-covered southern slopes the effects of glaciation, the continuing rise of the land and the high rainfall result in a very unstable landscape, with rockfalls and landslides an ever-present hazard.



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## Disappearing islands

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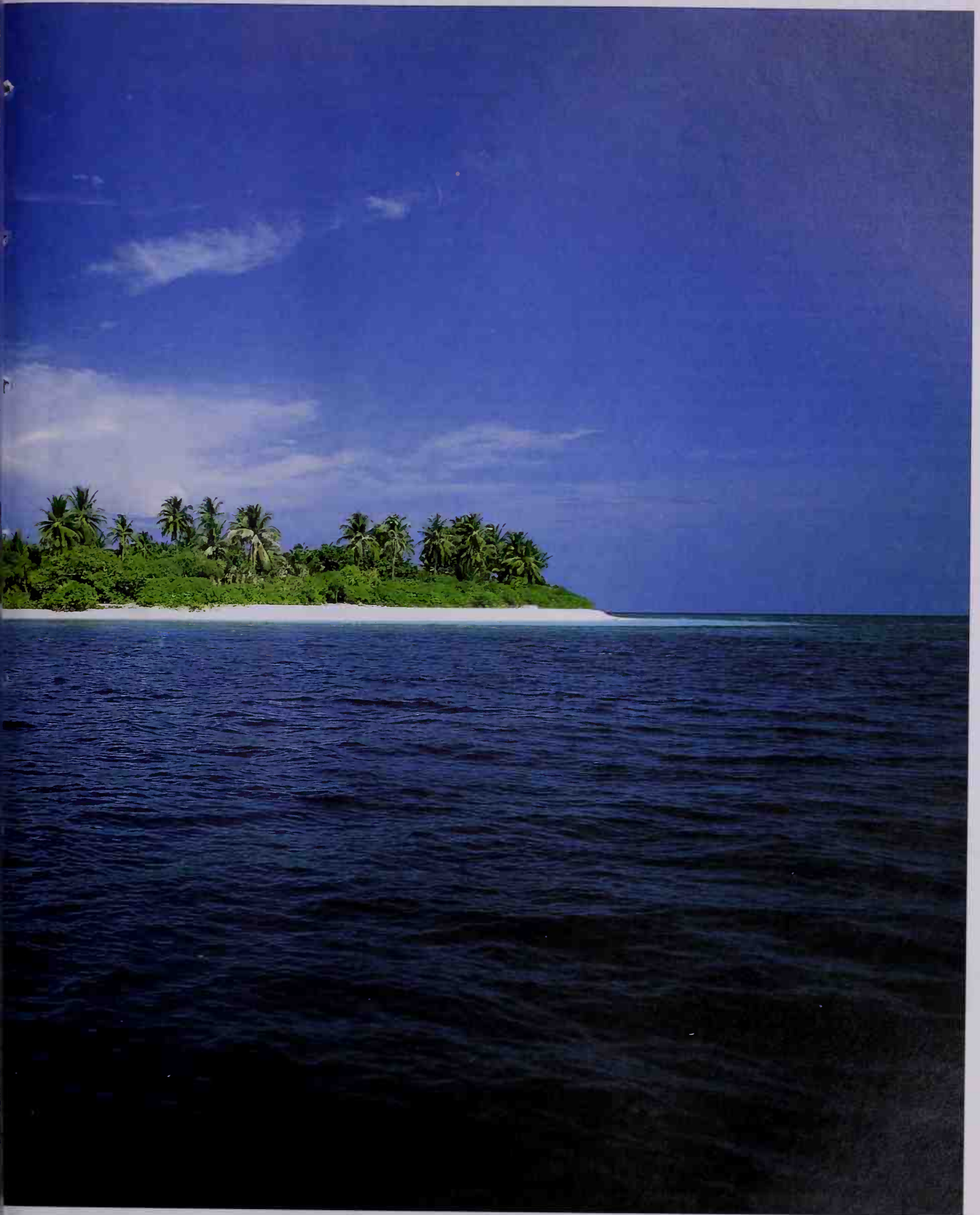
Pollution of the atmosphere could cause one of the world's most low-lying countries to vanish completely.

The 1,800 small coral islands and sandbanks making up the Maldives are built on the crowns of old volcanoes that have been submerged beneath the Indian Ocean. Starting 595 km (370 mi) southwest of India's southern tip, the islands extend 764 km (475 mi) to the south. None of them rises to more than 1.8 m (6 ft), and they are protected from violent storms only by the coral reefs that form a ring around the islands.

The islands are threatened by the rise in sea level that is expected to result from the global warming taking place because of the greenhouse effect. Gases such as carbon dioxide trap the heat radiating from the surface of the Earth and keep it warm. However, an extra 5 billion tonnes of carbon dioxide enters the atmosphere every year from the burning of fossil fuels such as coal and oil. Scientists predict that the temperature of the Earth will rise by between 1.5°C and 4.5°C (2.7–8.1°F) in the next 50 years or so. This will cause the polar ice caps to recede, releasing more water into the oceans. Furthermore, the water in the oceans will expand as it warms. The resulting rise in sea level will be sufficient to threaten or even completely inundate the 200 and more islands that are inhabited by some 250,000 people.



**Doomed to extinction,** the islands of the Maldives are likely to disappear beneath the rising Indian Ocean as global warming continues.





# HABITATS AND THEIR CONSERVATION

THE GREAT VARIETY · A LONG HISTORY OF PROTECTION · PEOPLE AND PARKS

The great physical contrasts of the Indian subcontinent have given rise to an enormous variety of habitats that in turn support a rich diversity of plants and animals. Thousands of species of flowering plants survive the low temperatures of remote valleys and mountain slopes, which in winter are snow-covered; the succulents that thrive in hot, scrub desert areas support gazelles and the livestock of pastoral nomads; and moist tropical forests and wet grasslands provide ideal cover for the world's largest cat – the tiger. Sadly, much of this diversity has been lost with the advance of agriculture and towns in what is one of the most densely peopled regions of the world. However, some habitats have long been protected by the sacred value accorded to wildlife by the ancient Hindu scriptures.

## COUNTRIES IN THE REGION

Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

Major protected area	Hectares
Bandipur NP	87,420
Chitral Gol NP	7,780
Corbett NP	52,082
Dachigam NP	14,100
Gir NP	25,871
Hazarganj-Chiltan NP	13,166
Kanha NP	94,000
Kaziranga NP	42,996
Keoladeo NP	2,873
Khunjerab NP	226,913
Kirthar NP	308,733
Lal Suhanra NP BR	31,441
Manas WS	4,385
Margalla Hills NP	14,786
Namdapha NP	198,524
Nanda Devi NP	63,033
Nilgiri (proposed) BR	552,000
Nokrek NP	6,801
North Island S (proposed) BR	49
Royal Bardia NP	96,800
Royal Chitwan NP WH	93,200
Ruhuna NP	97,881
Sagarmatha NP WH	114,800
Sinharaja FoR BR WH	8,864
Sundarbans WP NP WH	133,010
Wagomuwa NP	37,063
Wilpattu NP	131,879

BR=Biosphere Reserve, FoR=Forest Reserve, NP=National Park, S=Sanctuary, WH=World Heritage site, WP=Wildlife Park, WS=Wildlife Sanctuary

## THE GREAT VARIETY

The habitats of the Indian subcontinent are diverse. They include the world's highest mountain range in the north, tropical forests, wet and dry grasslands, warm desert in the northwest, mangrove forests in the east and coral reefs in the surrounding oceans, with rich marine life and palm-fringed beaches.

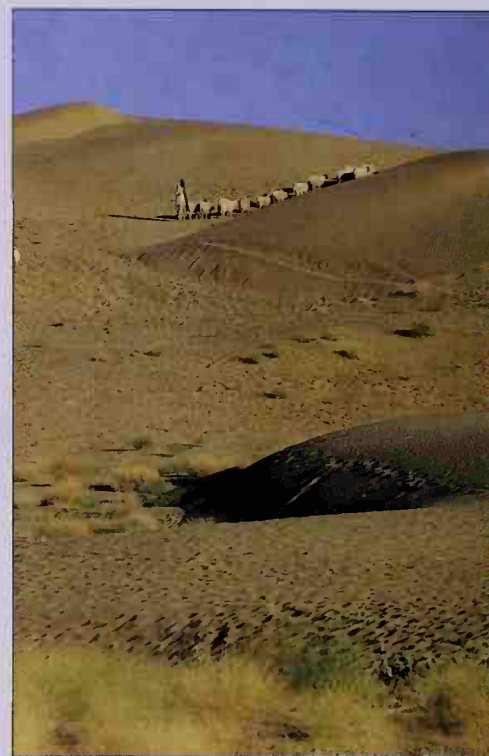
Forests once covered much of the subcontinent, providing food and shelter for many large mammals, including Indian elephants, deer, leopards, tigers, langurs (monkeys), and a host of birds. Much of the original forest has been felled for fuelwood, timber, and to clear the land for agriculture. In India forest covers only 11 percent of the country, but in Bhutan, where development has not proceeded apace and conservation of forests is given high priority, 53 percent of the forest cover remains.

The diversity of plant and animal species on the subcontinent is a legacy of its turbulent geological past. When the Indian subcontinent collided with the mainland of Asia some 40 million years ago, pushing up the Himalayas as it did so, plant and animal species from both land masses migrated into new habitats, diversifying as they spread.

### Contrasts in the north

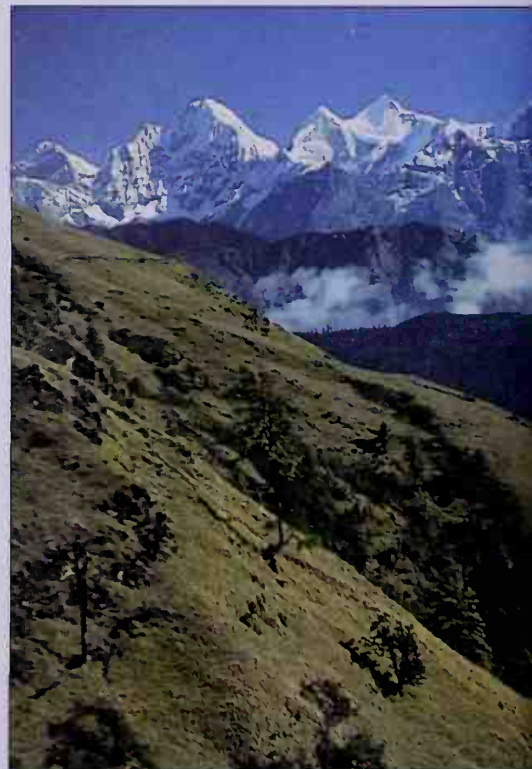
Despite the inhospitable climate of the northern mountains, a variety of plants and animals manage to live there. The eastern Himalayas, for example, with about 4,000 species of flowering plants, have one of the richest collections of plant species in the world. There are semi-evergreen forests of rhododendrons, laurels, maples, alders, oaks, birch and conifers below the treeline. In the western Himalayas mixed oaks and conifers predominate, with deodar (Indian cedar) on drier aspects and chir pines and sals (a native broadleaf) farther down. These forests and the alpine meadows support many species of grazing and predatory mammals, including leopards and both brown and Himalayan black bears.

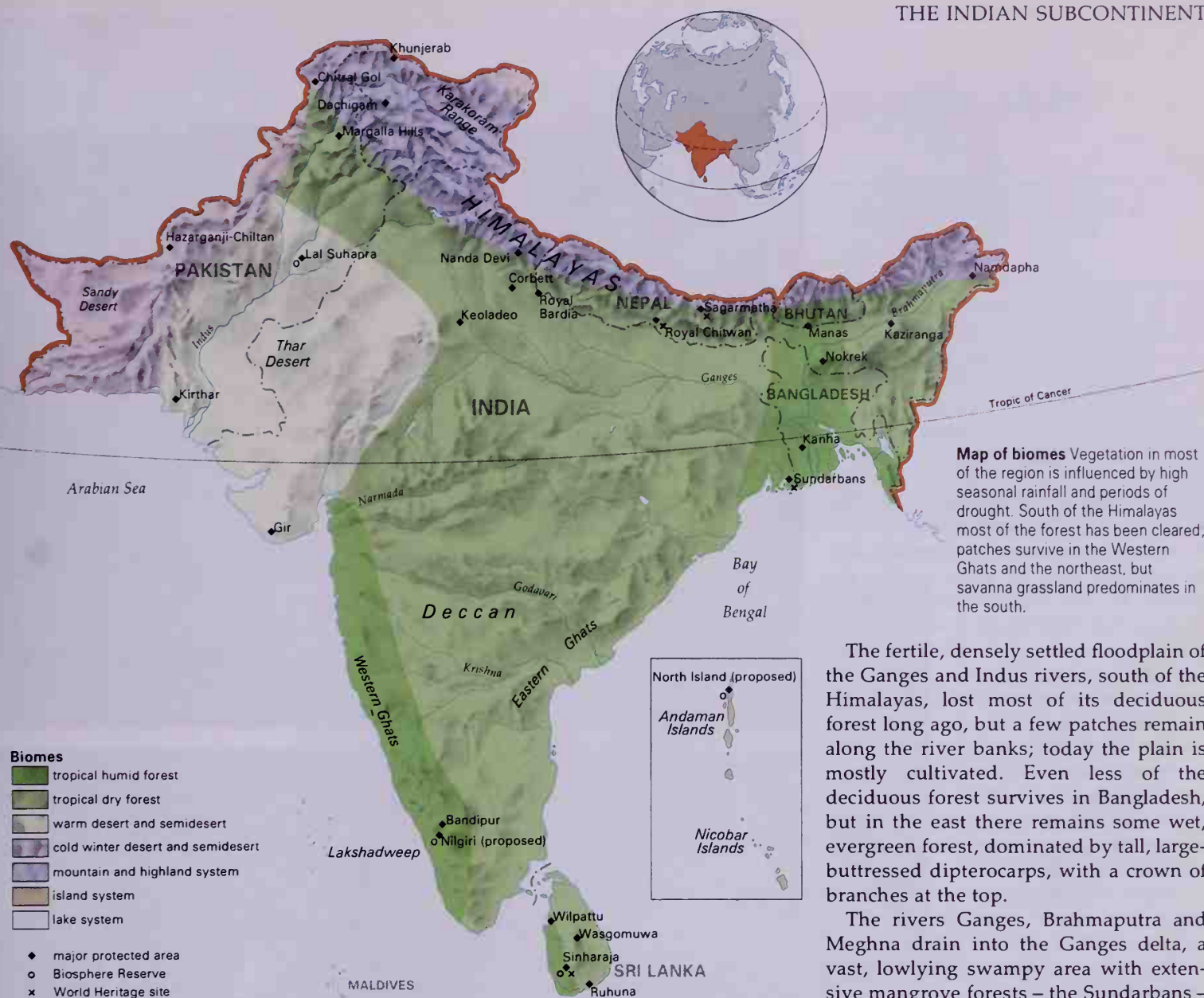
Adjacent to the Himalayan foothills is a belt of marshy jungle and wet grasslands known as the terai. Here, sals, bamboos and tall grasses are grazed by mammals such as Indian rhinoceroses, wild water buffaloes, gaurs and several species of deer, and they also provide cover for tigers.



**In search of grazing** A Rajput shepherd with his flock among the sand dunes of the Thar Desert, part of the wide desert belt that stretches from the Sahara to the Gobi. Overgrazing and clearance of tree cover for fuel means that the Thar Desert is spreading at a rate of 8 km (5 mi) a decade.

**Coniferous forests** that cling to the upper slopes in Sagarmatha National Park begin to thin out near to the treeline, at about 4,000 m (13,100 ft). Mount Everest lies on the park's boundaries.





The fertile, densely settled floodplain of the Ganges and Indus rivers, south of the Himalayas, lost most of its deciduous forest long ago, but a few patches remain along the river banks; today the plain is mostly cultivated. Even less of the deciduous forest survives in Bangladesh, but in the east there remains some wet, evergreen forest, dominated by tall, large-butressed dipterocarps, with a crown of branches at the top.

The rivers Ganges, Brahmaputra and Meghna drain into the Ganges delta, a vast, lowlying swampy area with extensive mangrove forests – the Sundarbans – and grassland, providing a rich habitat for mammals, birds and reptiles.

To the west lies the Thar Desert. On its rocky hills and plains grow scattered bushes and low trees of gum arabic, spiny acacia, succulents, the ubiquitous khejri (an evergreen tree found only in this area) and tamarisk. The plants support grazing mammals such as wild asses, blackbucks and chinkara. Birds that can tolerate the arid conditions include the great Indian bustard, the houbara bustard and the imperial sandgrouse.

#### The peninsula

Peninsular India consists of the Deccan plateau, a dry area covered with short-grass savanna and a few palm species unique to the area (endemic species). The mountains of the Western and Eastern Ghats run parallel to each coast, and are clothed in moist, evergreen forests. Lion-tailed and bonnet macaques, bats, giant squirrels, mongooses, hares, several species of deer, gaurs, tigers, wild boars and elephants dwell in the forests.





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## A LONG HISTORY OF PROTECTION

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The protection of nature has a long history in the Indian subcontinent. Several thousand years ago sacred groves were established by hunter-gatherer communities; limited use of their resources was sanctioned only during times of calamity such as fire and drought. Sacred groves are widespread in India – more than 400 are known of in the western state of Maharashtra – and in Nepal. The Vedas, ancient Hindu scriptures, contain directives to protect the environment and all forms of life. As early as the 4th century BC, the establishment of forest reserves was being advocated in the Arthashastra, a manual of statecraft.

Much later, princes and kings preserved many areas specifically for hunting. Today, these form the basis of a number of existing national parks and sanctuaries, such as Chitral Gol in Pakistan, Keoladeo and Ranthambor in India, Royal Chitwan in Nepal and Manas in Bhutan. Many more protected areas, established over the last hundred years or so, began as forest reserves to safeguard timber and water resources. Examples include all three wildlife sanctuaries in the Sundarbans of Bangladesh, as well as Sinharaja in Sri Lanka.

### Legislating for conservation

Legal provision for protected areas first appeared in Sri Lanka in 1885, following which two game reserves were established – Ruhuna in 1900 and Wilpattu in 1905. Both sites were given national park status in 1938, the same year that Corbett (then named Hailey) National Park was established in India. A dozen more reserves were created at the same time, and others soon followed. By the middle of the century Sri Lanka possessed some of the best wildlife conservation areas in the region. Today, just over a tenth of the island's land area has been granted official protection.

In both India and Pakistan, where conservation is the responsibility of the provincial governments, legislation providing for the establishment of protected areas was adopted in the 1970s. Subsequently there has been an enormous growth in protected areas. Conservation laws were passed in Bangladesh and Nepal in 1973. Bhutan as yet lacks com-



parable conservation legislation, but its protected areas, notified under the Forest Act of 1969, cover a fifth of the country.

Conservation is in its infancy in the Maldives, although a Nature Conservation Act has recently been drafted and a network of reserves proposed. The islands of the Maldives and the Chagos, which contain the largest expanse of undisturbed coral reefs in the Indian Ocean, are of international importance. For the moment, conservation on the Chagos islands is assured: the United Kingdom–United States naval base on Diego Garcia restricts access to the islands to military personnel only.

### Forms of protection

Most of the protected areas in the subcontinent are national parks and sanctuaries.

Both protect wildlife, but whereas traditional uses of natural resources, such as grazing and the collection of timber, fuelwood and other forest products, are usually prohibited in national parks, they may be allowed in sanctuaries, provided they do not hinder conservation. The reverse is the case in Bangladesh and Pakistan, however, where settlement and grazing by livestock are prohibited in sanctuaries but not in national parks.

Game reserves established for hunting purposes are found in all countries in the region except Sri Lanka. Sri Lanka has several strict nature reserves – areas of outstanding ecological importance, to which access is permitted for scientific purposes only. Two of them form the cores of the Ruhuna and the Wasgomuwa National Parks. Nepal is the only other





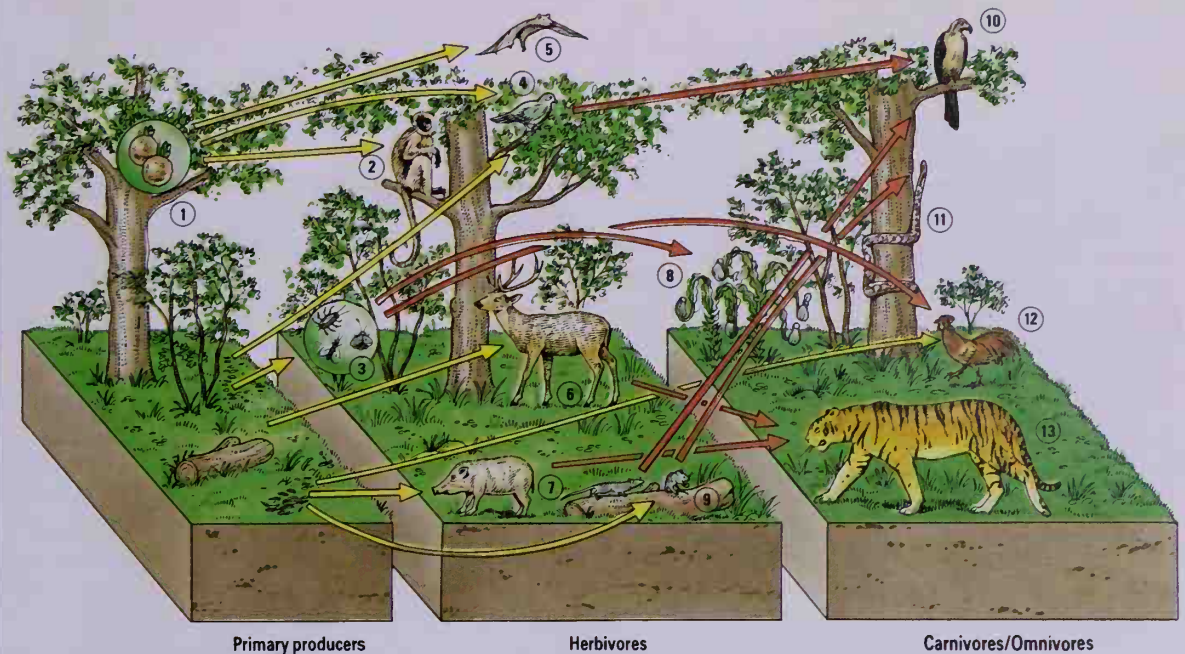
#### A royal hunting ground

Ranthambor National Park formerly belonged to the Maharajahs of Jaipur, whose forts lie scattered through its forests. Today it is a sanctuary for the tigers that were once hunted in the royal chase.

#### Villagers remove excess vegetation

in Keoladeo National Park. Water buffalo and cattle, which would keep it in check, may not graze in India's national parks.

**The mangrove swamps** of the Sundarbans supports the largest tiger population in the subcontinent. The tigers prey on the numerous spotted deer (chital) of this fertile ecosystem.



#### Components of the ecosystem

- 1 Sal trees
- 2 Hanuman langur
- 3 Insects
- 4 Green pigeon
- 5 Indian flying fox
- 6 Chital deer
- 7 Pygmy hog
- 8 Pitcher plant
- 9 Spiny mouse
- 10 Crested hawk eagle
- 11 Indian python
- 12 Red jungle fowl
- 13 Tiger

#### Energy flow

- Yellow arrow: primary producer/primary consumer
- Red arrow: primary/secondary consumer



#### A monsoon forest ecosystem

supports a wide variety of species. Many forest soils are lacking in nutrients. Some plants, such as the pitcher plant, have adapted to the lack of nitrogen by becoming carnivorous, ingeniously trapping insects to make good the deficiency.

### THE SUNDARBANS

On the world's largest delta, at the mouth of the Ganges river, lies the Sundarbans. It is one of the world's most extensive mangrove forests, covering some 1 million ha (2.5 million acres). In India 130,000 ha (321,230 acres) of this area is officially closed to all kinds of exploitation and forms the core of a much larger tiger reserve. In Bangladesh 32,386 ha (80,026 acres) are protected in three separate sanctuaries.

The vegetation in the Sundarbans contains some 334 plant species, including the elegant sundari tree from which the place takes its name. The unique mixture of species includes some related to the plants of Southeast Asia, Polynesia, Ethiopia and even the New World. The Sundarbans is the only mangrove forest in the world inhabited

by tigers: it supports the largest tiger population (600–700) in the subcontinent. The man-eating Sundarbans tiger poses a very real threat to human life.

The Sundarbans is a valuable source of timber, fuelwood and honey, and its waters contain an abundance of fish and crustaceans, vital for the local economy. It is under increasing pressure from overexploitation of timber, cultivation and poaching, particularly on the Bangladesh side. Large-scale irrigation projects in the Ganges floodplain have reduced the flow of fresh water, resulting in saline conditions that may have caused vegetation to die off. The long-term survival of this unique ecosystem depends on the careful management and balanced use of land and water resources farther upstream.

nation with legal provision for strict nature reserves, but none has yet been established there.

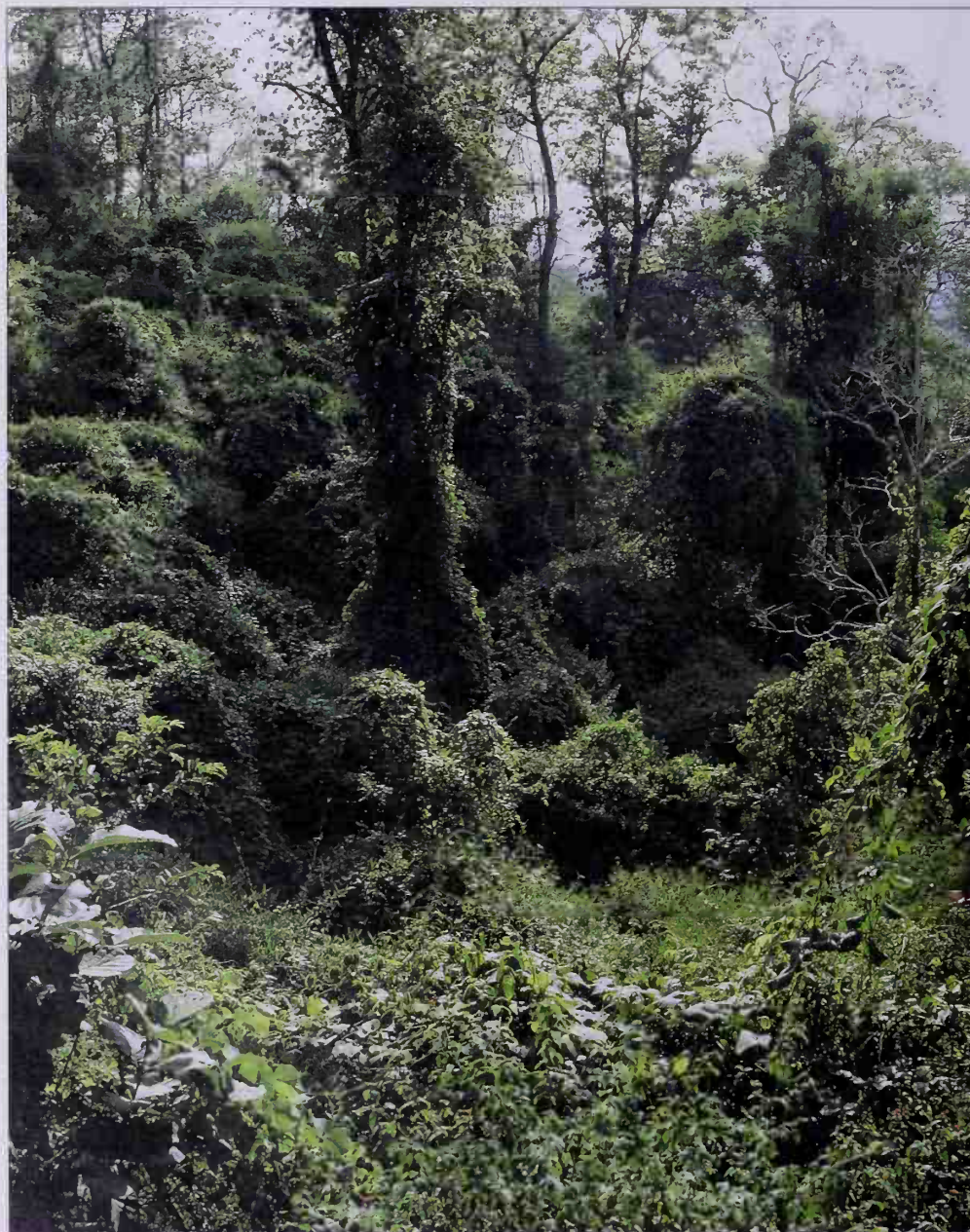
In Bangladesh most of the remaining wildlife is found in forest reserves, but the country's existing network of protected areas is not comprehensive. Low priority has been accorded to wildlife conservation owing to economic constraints but, like Nepal and Pakistan, Bangladesh is in the process of developing a national conservation strategy. In India there are plans to increase the number of protected areas to cover some 150,000 sq km (58,000 sq mi), amounting to nearly 5 percent of the country.

All the countries of the region, except Bhutan, are party to the World Heritage Convention; World Heritage sites have been declared in India, Nepal and Sri



Lanka. A number of important wetlands have been designated under the Ramsar Convention of 1971, signed by Pakistan, India, Nepal and Sri Lanka. The Man and the Biosphere Program launched under the auspices of UNESCO is not yet far advanced in the subcontinent: Biosphere Reserves exist only in Pakistan and Sri Lanka. India is in the process of creating the Nilgiri Biosphere Reserve in the southwest of the peninsula, and has identified 12 other potential sites.

**Moist evergreen forests** grow in the Anamalai Sanctuary on the hills of the Western Ghats in southern India, where rainfall is high. They are rich in species; monkeys, squirrels and bats live in the tree canopy, and several species of deer, gaurs and elephants browse the lower branches and understorey.



## PEOPLE AND PARKS

Extensive changes to the environment of the Indian subcontinent have had severe repercussions. Soil salinity and erosion have turned more than a third of India into a wasteland. In Pakistan, land irrigated by the Indus is becoming increasingly uncultivable because of waterlogging and excess salt. It is argued that deforestation of the Himalayan watersheds has caused rivers and dams to silt up, leading to greater flooding on the Indus and Ganges river plains. There is an urgent need for land-use planning to reconcile production requirements with habitat protection.

### The cost of development

Development schemes pose a great threat even to protected habitats. Some 4,200 ha (10,400 acres) of alluvial grasslands in Corbett National Park were inundated in 1974 as part of the Ramganga River Project. The creation of a reservoir, while attracting large numbers of water birds, severely reduced the local populations of deer and cut elephants off from an important traditional migration route. The main problems, however, are fires, which in one year swept across nearly 30 percent of the park, and infestation by exotic weeds such as lantana and cannabis.

Dam projects are becoming increasingly controversial. For example, the decision to go ahead with a hydroelectric project in Silent Valley in southwestern India, site of one of the last stands of virgin tropical evergreen forest in the subcontinent, led to a fierce environmental debate. The project was finally cancelled in 1983 and the area is now a national park and part of the proposed Nilgiri Biosphere Reserve.

Encroachment on protected areas is a widespread problem. Occasionally it has even led to violent confrontation. In 1982 the exclusion of several thousand cattle and water buffalo from Keoladeo National Park, a manmade wetland of World Heritage status, kindled local resentment and ended in a forced entry into the park in which eight people were killed. In the absence of grazing livestock, water plants are allowed to grow unchecked and the wetland now provides little open water for migratory ducks.

Protected areas attract an increasing number of visitors. While tourism often contributes significantly to the national and local economy, it can also erode local culture and lead to inflation, inappropriate development of tourist facilities, overcrowding and increased dumping of garbage. In Nepal, where tourism is the major source of foreign exchange, garbage became such a problem at the base-camp on Mount Everest that in 1984 an expedition was organized to clean up the site. More than 1,800 loads of refuse were collected and removed.

### Embracing the trees

One of the most important developments has been the growth of voluntary conservation organizations. Out of the growing ecological crisis in the Himalayas arose the now world-famous Chipko, or "Em-





**Grasslands predominate** in the dry countryside of the Manas river plain in Assam in northeast India. The habitat supports a variety of species, including two rare mammals, the hispid hare and pygmy hog. However, burning by farmers to improve the grazing for livestock is putting pressure on the surviving wildlife of the area.

**Gal Oya National Park** in Sri Lanka was created as a water catchment area for the large reservoir that lies at its heart. Most of the park is savanna grassland with patches of forest, and it is a sanctuary for elephants and the many birds that nest around the reservoir.

brace the Trees" Movement, with its guiding Gandhian philosophy of nonviolent resistance. Its first action took place in April 1973, when villagers demonstrated against contractors felling trees in Mandal forest.

The movement spread like wildfire, and in 1981 won its demand for the protection of Himalayan forests when a 15-year ban was placed on commercial felling in the hills of the state of Uttar Pradesh. The ban was followed in 1983 by a national moratorium on the felling of trees above an altitude of 1,000 m (3,300 ft). The Chipko Movement has also stopped clear-felling in the mountains of the Western Ghats in southern India, and in the Vindhya Range in the northern Deccan. It has pressed for an environmentally sound national forest policy that is more sensitive to people's needs.

An enlightened forest policy already exists in Bhutan, where a high conservation value is placed on forest resources and they are not simply exploited as a source of revenue. All forest land above 2,700 m (8,860 ft) or on slopes steeper than 60 degrees is protected. Grazing is not allowed in these forests, and the practice of shifting cultivation is additionally prohibited on slopes of 45 degrees or more.

Awareness of the need to change the emphasis from "people versus parks" to "people and parks" lay behind the proposal for a conservation initiative in India, to be called Project Snow Leopard but yet to get off the ground. The plan is to establish a number of reserves to protect this endangered species and its habitat, which will entail the active involvement of the people already living in the reserves.

## THE MAHAWELI PROJECT

A multibillion-dollar development program has been set up in Sri Lanka to harness the country's largest river – the Mahaweli – and its tributaries, to generate hydroelectricity and irrigate agricultural land. The affected area covers some 420,000 ha (1 million acres) in the interior of the island, including some of Sri Lanka's finest tropical, dry, mixed evergreen forest, as well as grasslands, swamps and riverside forests. It is rich in plants and animals, with many endemic species, and supports about a third (some 800) of the nation's elephants as well as other threatened mammals, birds and reptiles. To mitigate the project's impact on the wildlife, a system of national parks and sanctuaries has been established within the area. Almost as much land is now under protection as is developed for agriculture and settlement.

The "Accelerated Mahaweli Project" has been heavily criticized. The scheme involves the compulsory resettlement of thousands of local people. Increasing soil salinity is already a problem and, since less than 10 percent of the upper water catchment area is forested, eroded soil is likely to silt up the reservoirs more quickly than anticipated. Environmentalists have pointed to an alternative, less harmful strategy for increasing food production by revitalizing the ancient network of 15,000 or so water storage tanks. The land could be irrigated from them and freshwater fish farmed in the tanks.



# Royal Chitwan National Park



Extending across the floodplains of the Narayani and Rapti rivers in Nepal, Royal Chitwan National Park, which was a royal hunting reserve from 1846 to 1951, is a remnant of the patchwork of forest and grassland that once covered the terai, or lowlands. About 70 percent of the park is covered with forests of sal, the dominant tree of the terai. Vegetation in the rest of the park is a constantly changing mosaic of grassland and riverside forest, which is in various stages of development (or succession) as the result of fire, and of flooding and riverbank erosion during the heavy rains of the monsoon season.

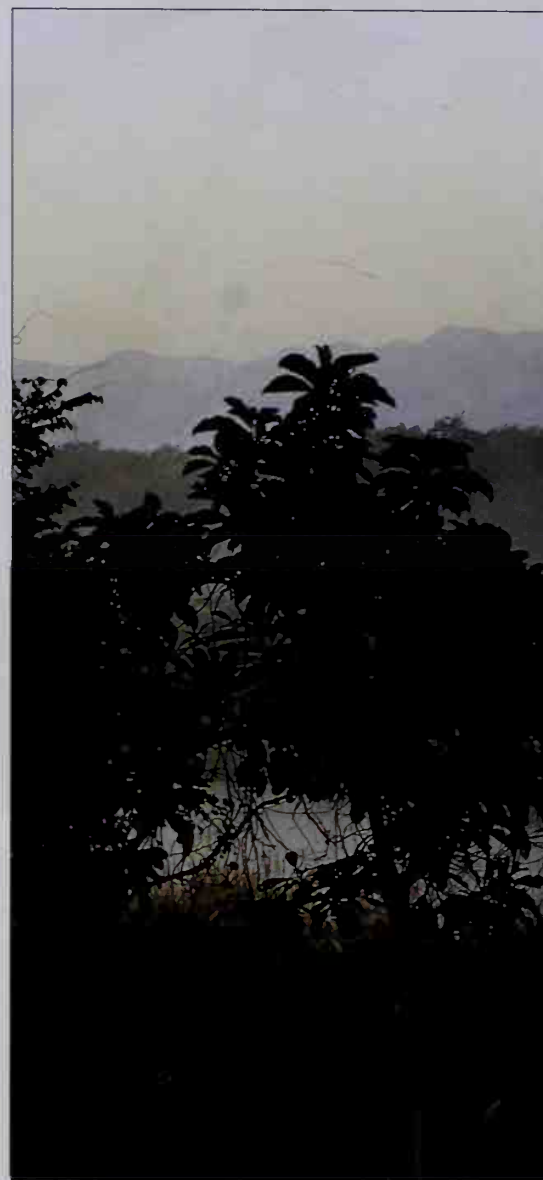
But the most outstanding feature of Chitwan is the diversity of its animal life – it has some 35 species of large mammals and 489 bird species. In recognition of this diversity and of the minimal disturbance caused to the ecosystem by human activity, Chitwan was designated a World Heritage site in 1984.

Chitwan's wildlife includes a number of threatened species, such as tigers, sloth

**A ride on an elephant** is the best way to see the wildlife in Royal Chitwan National Park. Although affording an unforgettable experience for visitors and providing a major source of revenue, tourism is a mixed blessing. It upsets the delicate balance between the local population and the ecosystem.

bears, gaurs, hispid hares, Ganges river dolphins, mugger crocodiles, gavials (or gharials) and Indian pythons. Chitwan and the Kaziranga National Park in Assam in the northeast of the subcontinent are the last strongholds of the greater one-horned or Indian rhinoceros, and a number have been successfully moved from Chitwan to Nepal's Royal Bardia Wildlife Reserve. The gaviel, similar to a crocodile, but with a long, slender snout, has been reintroduced into the park's rivers: these are reared in captivity from eggs taken from the wild, then released into the park's rivers. Chitwan has a fine tradition of scientific research.

Until recently, few people lived in the terai because of the high risk of malaria. Following the virtual eradication of the



disease in the 1950s, settlers began to clear the sal forests for cultivation. By 1959 some 12,000 people had moved into grasslands formerly grazed by rhinoceroses, and many more had moved in illegally. That same year the government, concerned about the threat to wildlife, established the Mahendra Deer Park, which was the basis of the national park, designated in 1973. Agricultural encroachment continued, and in 1963 22,000 people were moved out of the Rapti valley under a new land settlement scheme.

Chitwan now has a reputation for being Nepal's best-managed national park. Poaching, formerly rife, has been brought under effective control, as shown by the increase in numbers of some of Chitwan's endangered species, notably the tiger and rhino. The tiger population more than doubled from about 25 in 1974 to over 60 by 1980, more than half of which live within the park. Similarly, the rhino population increased in 20 years from 100 in 1968 to about 370 in 1988.





**Jungle and mist at dawn** against the snow-capped Himalayas. The marshy jungles of Chitwan, a World Heritage site since 1984, are a refuge for several threatened mammal and reptile species. Much of the park's scientific research is carried out with the Smithsonian Institution of the United States.

**Deciduous sal trees** withstand the seasonal heavy rains and periodic droughts of the monsoon belt. They are the characteristic tree of the terai lowlands and cover much of Royal Chitwan National Park.

The increased numbers of animals have, however, intensified problems in the areas of human settlement around the edge of the park. Damage to crops, mostly by rhinos, wild boar, spotted deer (chital) and parakeets, can amount to the total destruction of the season's crop in some villages. Moreover, tigers and, to a lesser extent, leopards prey on livestock and, occasionally, villagers.

To the east of the park, in Padampur Panchayat, the problem was solved by resettling 7,000 people from 10 villages, a move that met with local support. However, it is neither politically nor

economically feasible to relocate any of the remaining 310 villages that surround the park.

Another source of conflict is tourism. Chitwan is Nepal's most popular national park, receiving thousands of visitors each year. The tourist industry has brought some jobs to villagers (and others work in the park), but most are worse off because the cost of living has been inflated.

The greatest benefit that the park bestows on the district is in conserving soil and water, but the villagers regard the grasslands as the park's most valuable asset since they build their houses from grass. The grasslands, maintained for centuries by cutting and burning, are harvested in January. Grass-cutting also benefits animals such as rhinos and deer, as the flush of growth that follows cutting and burning provides good forage. This intimate relationship between wildlife conservation and local people is a model to be encouraged in other areas where the two may conflict.



# ANIMAL LIFE

FROM THE MOUNTAINS TO THE SEA · OF HEIGHTS, HEAT AND DUST · FEARED AND REVERED

The Indian subcontinent has a rich mix of wildlife, with about 500 species of mammal, 1,300 bird species and several hundred species of amphibian and reptile. This diversity is a result of the region's varied topography, altitude and climate. The subcontinent's turbulent geological history has further enriched the wildlife with animals more typical of other regions. Many Indian mammals are rarely seen, as most are nocturnal forest dwellers; but this is compensated for by the birds, which are conspicuously active by day. Wildlife ranges from the Snow leopard of the remote Himalayas to the crocodiles that inhabit the Sundarbans mangrove swamps of the Ganges delta; from the tiger and rhinoceros of the dense jungles to the bustards and gazelles of the Thar Desert of northwestern India and eastern Pakistan.

## COUNTRIES IN THE REGION

Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

## ENDEMICISM AND DIVERSITY

Diversity High  
Endemism High

## SPECIES

	Total	Threatened	Extinct†
Mammals	400	42	0
Birds	1,400*	81	3
Others	unknown	52	0

† species extinct since 1600

\* breeding and regular non-breeding species

## NOTABLE THREATENED ENDEMIC SPECIES

**Mammals** Lion-tailed macaque (*Macaca silenus*), Hispid hare (*Caprolagus hispidus*), Indus river dolphin (*Platanista minor*), Indian rhinoceros (*Rhinoceros unicornis*), Pygmy hog (*Sus salvanius*), Swamp deer (*Cervus duvauceli*)  
**Birds** Lesser florican (*Sypheotides indica*), Jerdon's courser (*Cursorius bitorquatus*), Western tragopan (*Tragopan melanocephalus*), Forest owlet (*Athene blewitii*), Great Indian bustard (*Choriotis nigriceps*)  
**Others** gharial (*Gavialis gangeticus*), Malabar tree toad (*Pedostibes kempi*), Green labeo (*Labeo fisheri*), Relict Himalayan dragonfly (*Epiophlebia laidlawii*), Scarce red forester (*Lethe distans*)

## NOTABLE THREATENED NON-ENDEMIC SPECIES

**Mammals** dhole (*Cuon alpinus*), Snow leopard (*Panthera uncia*), tiger (*Panthera tigris*), Asian elephant (*Elephas maximus*), Musk deer (*Moschus moschiferus*)  
**Birds** Greater adjutant (*Leptoptilos dubius*), Green peafowl (*Pavo muticus*), Siberian crane (*Grus leucogeranus*)  
**Others** Desert monitor (*Varanus griseus*), Kaiser-I-Hind butterfly (*Teinopalpus imperialis*)

## DOMESTICATED ANIMALS (originating in region)

mithan (*Bos frontalis*), Water buffalo (*Bubalus bubalus*), yak (*Bos grunniens*), Asiatic elephant (*Elephas maximus*), chicken (*Gallus gallus*)

## FROM THE MOUNTAINS TO THE SEA

The region's wildlife is a mix of species of diverse origins. India was once part of the ancient supercontinent, Gondwanaland, which also included the landmass of present-day Africa. Consequently, some of its animals, such as the Asiatic lion, the bustards and the sandgrouse, have affinities with African animals. After the Indian subcontinent collided with the Eurasian mainland some 40 million years ago, Indochinese species such as the tiny mouse deer or chevrotains – which are intermediate in form between pigs and deer – and lorises (short-tailed relatives of bush babies) have colonized from the east. Some Chinese species, including the small Lesser or Red panda, the goral and the serow (both goat antelopes) and many species of babblers (from a large family of songbirds) have extended their range into the Himalayas. Other animals have advanced from the northwest to colonize new habitats.

Many distinctive species live in the mountains and forests of the Himalayas. The Snow leopard, one of the world's rarest and most elusive animals, still survives in the more remote areas. Several species of wild sheep and goat also live here, including the nayan, the world's largest sheep. The ungulates (hoofed mammals) include the primitive little Himalayan Musk deer; the males are easily distinguished by their protruding canine teeth. The Brown bear inhabits the open ground of the alpine meadows above the treeline, while the Himalayan black bear takes advantage of the protection offered by the forests lower down the slopes. The birds of the Himalayas are very varied; they include gorgeously colored pheasants with their striking iridescent plumage and long tail feathers, and noisy gregarious babblers that flutter through the forest canopy and forage in the undergrowth.

### Plains, desert and plateau animals

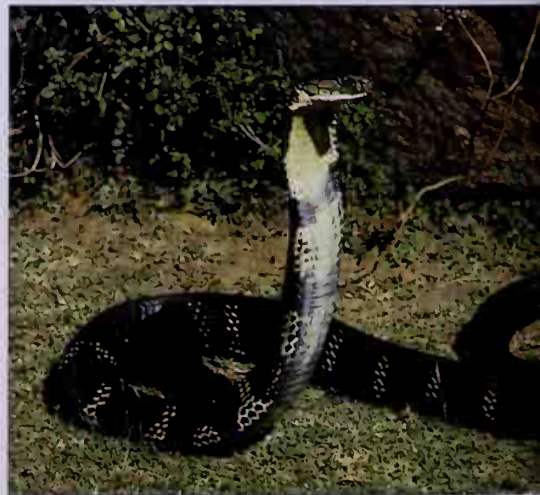
To the south of the Himalayas lie the great floodplains of the Ganges, Indus and Brahmaputra rivers where some of the most important reserves for the Indian tiger are located. The tigers prey on the numerous deer of the plains, especially the Spotted or Axis deer. The subcontinent's two largest animals, the Asian

elephant and the Indian rhinoceros, also survive in reserves, much of their natural habitat having been lost to cultivation by farmers. In western India the dry rolling hill country of the Gir National Park provides the last refuge of the Asiatic lion.

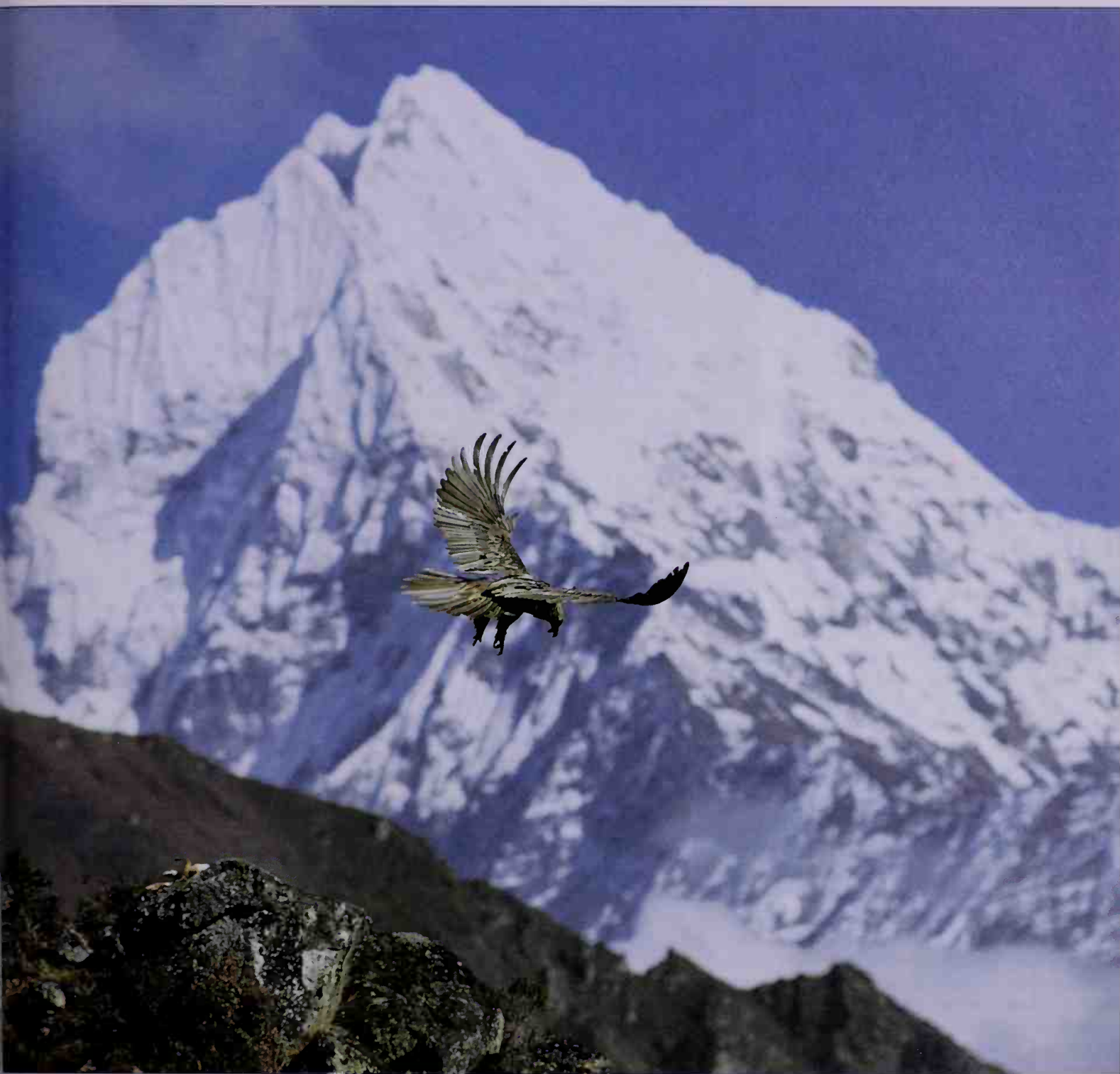
The region's wetlands – in particular the sanctuary at Keoladeo in north central India – provide a wonderful spectacle of bird life. In wet years many thousands of large waterbirds breed in the sanctuary, and tens of thousands of ducks overwinter here, along with the extremely rare Siberian crane.

West of the Gangetic plain lies the Thar or Great Indian Desert where blackbuck, Wild asses and graceful Indian gazelles were once abundant. Now their numbers are much reduced. Notable among the desert birds are the endangered Great Indian bustard and various species of sandgrouse. Monitor lizards – the largest and heaviest lizards in the world – are powerful predators that prey on small desert mammals, birds, other lizards and their eggs, and they also take carrion. They have a reputation for being very ferocious hunters, often swallowing their prey whole.

South of the plains, Asian elephants and gaur – large wild oxen – still roam wild in the less accessible parts of the dry Deccan plateau. The hill forests of the Western Ghats and Nilgiri Hills on India's west coast shelter a number of species that are endemic to the region; these include the endangered Lion-tailed macaque monkey, the Nilgiri tahr (a goat) and the Nilgiri langur (a leaf monkey). Sri Lanka also has many endemic species in its tropical forests, mangrove swamps and floodplains.







**Bird of the high mountains** (above)

A lammergeier or Bearded vulture, which in flight resembles a huge falcon, soars in front of Mount Thamserku in Nepal. This vulture covers a vast area in search of carrion; its long, narrow wings enable it to glide for long distances. It will sometimes descend to scavenge near towns and villages.

**The King cobra** (left), the world's longest poisonous snake, grows to a length of 5.5 m (18 ft) or more. When threatened or curious, the snake can rear to a height of over 1.2 m (4 ft). It lives in the swamps and forests of northern India, and is unusual among snakes in making a nest for its eggs.



**Marine and island life**

The 2,500 or so scattered coral islands and reefs of the Maldives have just two native mammal species – both fruit bats – and only five species of reptile, all of them introduced. Some 120 species of migrant birds pause here on their journeys, and a number of seabirds, such as the graceful White-tailed tropic bird and the Lesser frigatebird, breed on the islands. The Andaman and Nicobar Islands in the Bay of Bengal are still largely covered in lush tropical forests that support a number of reptile species and 14 endemic species of bird. One of these is the Nicobar megapode, a terrestrial bird about the size of a

domestic hen. The eggs are incubated under mounds of heat-producing decomposing humus, which are covered over with sand.

The shallow waters of the Indian seas support a rich diversity of marine life. The once abundant Sea cow or dugong is now seen only rarely, its population having been greatly reduced by overfishing and accidental trapping in fishing nets. Numerous sea turtles nest on the beaches, including the Green turtle and the hawksbill. The Maldives and, farther north, Lakshadweep, are famous for their coral reefs and associated rich variety of fish and invertebrates.



## OF HEIGHTS, HEAT AND DUST

The Himalayas are home to one of the world's highest-living mammals, the wild yak. Its long, dense, woolly fur, reaching almost to the ground, provides good insulation. Like some other high-altitude mammals, the yak has developed large lungs that help it obtain sufficient oxygen in the thin mountain air. Another mammal supremely adapted to the peaks is the magnificent Snow leopard; it, too, has a thick coat to shield it from the cold, and fur on the soles of its paws to ensure a firm grip on the ice. Perhaps the most skillful climbers of the high Himalayas are the wild sheep and goats, such as the Blue sheep and the Himalayan tahr. They scale the precipitous slopes with ease in search of the sparse vegetation. Severe competition from domestic stock and overhunting, however, has led to their disappearance from many areas.

Several mountain animals, such as the Snow pigeon, are altitudinal migrants that move to the lower slopes in severe winter weather. Some animals, such as the Himalayan marmot (a member of the squirrel family) survive the winter by hibernating. They excavate deep, snug burrows in which to escape the cold. The large family of adult male and female marmots and their young sleep huddled together in their communal den.

Specialized forms of butterflies, grasshoppers, caddisflies, beetles, springtails, mayflies and stoneflies live at high altitude above the treeline. Some even thrive at a height of 6,990 m (23,000 ft). While many feed on plants such as lichens and mosses, the great majority are scavengers sustained by dead insects and spiders, fungal spores and seeds that have been lifted from the distant Indian plains by hot air currents. On bright summer days numerous beetles and other insects can be seen hunting for such debris on the Himalayan snowfields.

In summer these insects are exposed to dangerously intense ultraviolet radiation, and many have developed dark pigmentation for protection. Strong winds blowing over the high peaks make flight very difficult, so most insects here are flightless. In winter the insects hibernate, relying on the snow cover for insulation against the bitter cold. The snow and ice are crucial to their survival, providing them with all the moisture they need.

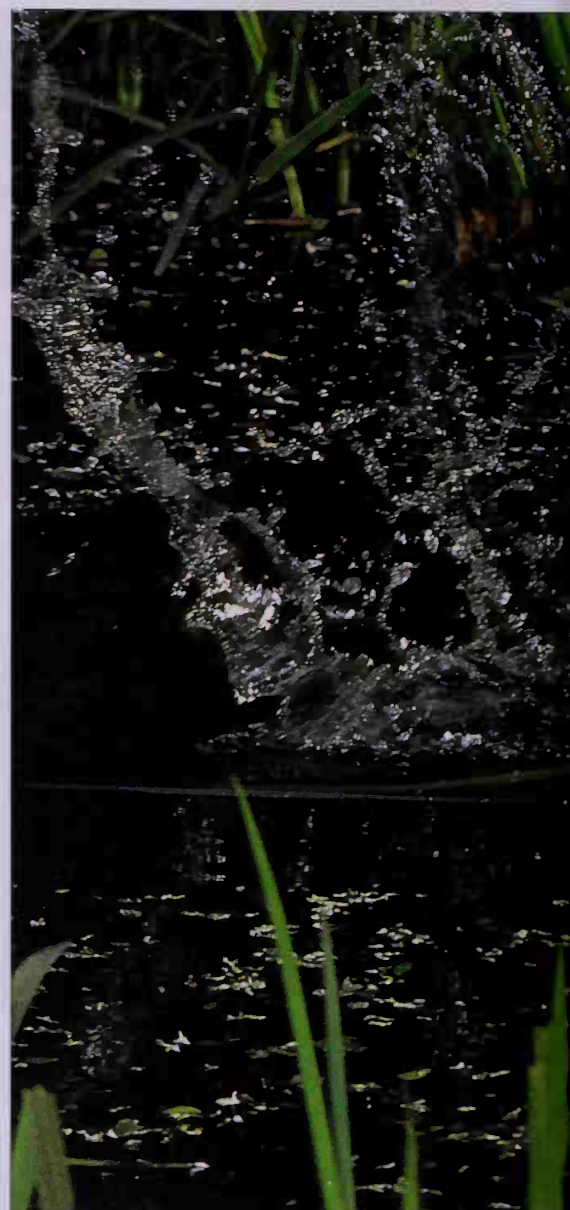
## Desert specialists

At the other extreme, many animals have adapted to the exposure of hot deserts. The elegant Indian gazelle is tolerant of extreme heat; its summer coat of very glossy hair is thought to reflect the sun's rays. The gazelle can survive for a week without drinking, and is capable of traveling up to 48 km (30 mi) a day to reach water. It grazes on desert plants at first light and late in the evening when dew forms on the leaves, thus deriving the maximum moisture from them. In such an open habitat the gazelle must be constantly vigilant if it is to evade predators; it has acute vision and hearing, and the ability to run at the exceptional speed of 72 kph (45 mph) over a long distance if danger threatens.

Another high-speed desert inhabitant is the Great Indian bustard, a large ground-dwelling bird endemic to the region. The bustard's long, strong legs enable it to run at great speed, but if it senses danger it will squat motionless behind a thorn bush, in an attempt to remain unseen by its enemies. The bird's plumage of a deep sandy buff color irregularly patterned with black acts as effective camouflage in the desert.

## Predators of land and water

The Indian subcontinent boasts five species of large cat: the Asiatic lion, the leopard, the Snow leopard, the Clouded leopard and the tiger. Of these, the leopard is the most successful and adaptable. Unlike the tiger, which is mainly nocturnal and restricted to forest habitats, the leopard is equally at home in scrub and open country and has also learned to live near human habitation. However, although it ranges throughout the region,



**The elusive Snow leopard** (above) on a rare fishing expedition. This beautiful and solitary creature needs a large territory in the barren mountains of India and Nepal in order to find enough prey.

**The smaller bears** (right) The shaggy Sloth bear uses its long claws and flexible snout to forage for termites and grubs. The Asian black bear is mainly herbivorous, but occasionally takes carrion.







## PHEASANTS

Pheasants are among the most brightly colored birds in the world. No fewer than 18 species are found on the Indian subcontinent. The males have the most brilliant plumage with elaborate patterns and long ornate tails; females are generally drab and patterned cryptically for concealment. During the courtship display the male Blue peafowl raises his magnificent long train to form a great arching fan of metallic bronze, green and blue. The male Himalayan monal – the national bird of Nepal – has even more dazzling plumage with nine iridescent colors that glisten in the sunlight. Iridescence also enhances the plumage of the Red jungle fowl – perhaps the most numerous bird in the world – believed to be the ancestor of the domestic chicken.

The majority of pheasants are forest birds. For most of the time such spectacular plumage is a hindrance rather than an advantage; the males tend to skulk in the thickets in order to conceal their brilliant colors from predators. Pheasants have strong feet and legs, often preferring to run away rather than fly. Hunting and forest destruction have reduced their numbers; seven species are considered threatened, including some of the most spectacular, such as the Western tragopan.



Sloth bear  
*Melursus ursinus*



Asiatic black bear  
*Selenarctos thibetanus*



Urial  
*Ovis orientalis*

**Agile goat antelopes (left)** These species inhabit rocky, steep terrain. The goral rarely moves far from the safety of the rocks. The Himalayan tahr prefers dense forest, the females move up to mountain pastures in the summer. The urial is long-legged and swift, and can survive in desert habitats.

it is very rarely seen. Its tawny coat, which is marked with black rosettes, provides excellent camouflage. Another explanation for its success is its varied diet; the leopard preys on a range of animals that includes deer, monkeys, large rodents and domestic animals. It is an adept treeclimber and can seize prey by jumping from overhead branches or leaping from the ground.

Another powerful predator of the region is the world's largest crocodilian, the rare and endangered gharial. Males of the species sometimes exceed 7 m (23 ft) in length. Gharials live in river pools and are well adapted for aquatic life, having streamlined bodies, webbed hind feet and a powerful tail for propulsion. They feed almost entirely on fish, snatching them in their long narrow jaws, which have more than 100 pointed teeth. The gharial is at serious risk of extinction, owing to loss of its river habitat from dams, human and industrial pollution, disturbance by increasing river traffic and loss of riverbank nesting areas.





## FEARED AND REVERED

Animals are intimately associated with culture and religion on the Indian sub-continent. Representations of animals are common in art, folklore and tribal dances, and ancient traditions of animal worship remain strong. Both Hindus and Buddhists regard nature as highly beneficial to humanity; strict adherents of these faiths will not kill animals of any kind. The current abundance of wildlife in Bhutan, India, Nepal and Sri Lanka can be largely attributed to these countries' dominant religions. By contrast, the majority of people in Bangladesh and Pakistan are Muslims, who are keen hunters.

### Sacred and honored species

Many animals in the region are widely regarded as sacred; the cow, for example, is sacred to the Hindus. Throughout the subcontinent millions of cows are allowed to consume vast quantities of vegetation;

**The people's friend (above)** The Asian elephant holds a special place in Indian culture and history. However, its traditional migration routes are being disrupted by agricultural and urban growth.

**Sacred monkey (right)** The Hanuman langur is a symbol of self-sacrifice for a friend in India. Langurs are often fed by temple worshippers, and are even allowed to steal food.

they are even free to help themselves to vegetables from stalls in city streets. Many cows are diseased, but for religious reasons they cannot be culled. Eating beef is regarded as unclean by most Hindus, so this valuable source of protein is wasted in a region where so many people are undernourished. Another sacred animal is the Sarus crane, which pairs for life; the couple's faithfulness to each other is legendary in India.

Large flocks of Oriental white-backed vultures and Long-billed vultures are often seen circling over cities searching for carrion. In some places they eat human corpses: people belonging to the Parsee religious sect leave their dead on





top of "towers of silence" to be devoured by vultures.

Popular sentiment provides protection for the striking Blue peafowl (peacock), and semitame flocks of these birds are common in urban parks and villages. Another animal that often lives close to people is the Rhesus macaque. Groups of these monkeys mingle freely with people at temples and railway stations.

The forest-dwelling Asian elephant is probably more a part of Indian history, culture and tradition than any other animal. The elephant has been in the service of people in India since at least 3500 BC. Owning an elephant is widely regarded as a sign of good fortune and as a status symbol. Unlike the African elephant, the females and many of the males of the Asian species lack commercially valuable tusks, and so escape the threat of being killed by ivory hunters.

#### From persecution to protection

Although wildlife is still abundant in many places, the region's animal populations have suffered alarming declines, especially during recent decades. A major cause is habitat destruction: by 1990 only 19 percent of the land was estimated to be forested in India, 8 percent in Bangladesh and as little as 3.5 percent in Pakistan. Other serious problems are poor land and water management, and pollution. Some of the region's most distinctive animals are threatened – for example, the tiger, the Asiatic lion, the Asian elephant and the Indian rhinoceros. As their habitats shrink and their natural prey decline, these animals increasingly come into conflict with people and livestock.

The Indian rhinoceros has long been persecuted for its horn, which is highly prized for its supposed medicinal powers. Nevertheless, as a result of the rapid increase in protected areas, the future for the rhinoceros is beginning to look brighter and numbers are steadily growing. Some rhinoceroses have been re-introduced to suitable habitats in order to widen their distribution.

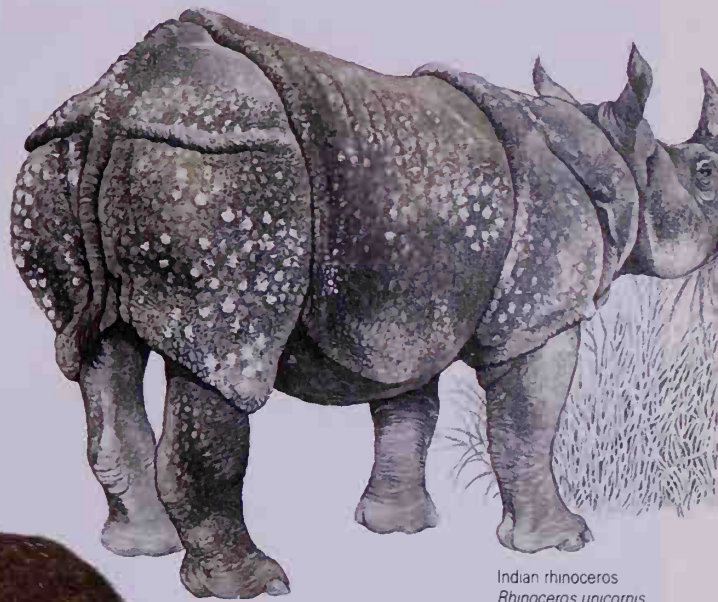
The creation of protected areas does not, however, seem to be halting the decline of the rare Red panda, which inhabits the temperate Himalayan forests. Recent research in Langtang National Park, Nepal, has revealed that mortality in both adults and cubs is extremely high because of human disturbance. The spread of human settlements into remote

**The Indian rhinoceros** (right) is much sought after for medicinal purposes. Its horn is valued as a cure for diverse ailments ranging from fever and lumbago to impotence. Poaching for this trade, and loss of habitat as a result of extensive forest clearances, have severely reduced its numbers.

**The "milk-step"** (below) Suckling in Musk deer is unusual in that the young touches the mother's hind leg with a raised foreleg. Newborn Musk deer are very small, and for the first few weeks of life lie motionless among rocks or in undergrowth, their dappled coats camouflaging them.



Musk deer  
*Moschus moschiferus*



Indian rhinoceros  
*Rhinoceros unicornis*

parts of the Himalayas also threatens the Snow leopard, one of the world's most endangered animals, and the wild sheep and goats on which it preys. Reserves have been created in India and Nepal but it is still hunted for its beautiful coat (although the loss of its wild prey is probably the more serious threat).

The Himalayan Musk deer is now endangered. It is hunted for its musk – the pungent secretion produced by a gland in the male – which is highly valued in perfumery. The Houbara bustard, one of Pakistan's most threatened birds, is also persecuted; hunting the birds is a popular winter sport among Arab sheikhs.

Considering the enormous pressures on wildlife and the natural environment, the region's governments, especially in Bhutan, India and Nepal, have given nature conservation a high priority. As much as 20 percent of Bhutan and almost 10 percent of Nepal are now national parks or reserves. There is strong support from some local people for forest protection in India. In an area where the majority of the population live at subsistence level, their needs are increasingly taken into conservation planning.

#### SNAKE FARMS

The people of the Indian subcontinent have an ambivalent attitude toward snakes, both fearing and venerating them. The majority of snake species are harmless to humans and indeed are highly beneficial, as they keep the huge rodent population in check. However, snakebites can cause much suffering, and even though antivenom serum – effective against most poisonous snakes – is available, about 40,000 deaths are recorded by the United Nations every year. The serum is produced by inoculating a horse with small doses of venom. The horse gradually develops a resistance to the venom in its blood, and when the blood serum is injected into a person who has been bitten it neutralizes the venom.

Large numbers of snakes are required to produce the quantities of venom needed to develop antidotes. Snakes are kept on farms where their venom is extracted by a skilled operation known as milking: the snake is grasped firmly by the head and enticed to bite through a cloth, so releasing drops of venom into a small cup underneath. Snake venom is one of the world's most valuable natural resources, being between 5 and 1,000 times more expensive than gold, depending on the species. The largest producers of snake venom in India are the Irula hunter-gatherers of the Nilgiri Hills in western India. The tribal cooperative catches and milks the snakes, but releases them into their natural habitat after three weeks, unlike other snake farms where they are kept for life.



# Project Tiger



The results of the Indian government's first ever tiger census in 1972 were alarming: the total population was only 1,827 animals. Concern was heightened when the tiger's status in other countries was shown. Tiger numbers had been reduced to only about 5,000, and those of the Indian race to a mere 2,400. This magnificent predator once dominated the tropical and subtropical forests throughout Asia; it has been estimated that there were as many as 100,000 in 1930.

The reasons for the tiger's dramatic decline were twofold: hunting pressures and habitat loss. People hunted tigers with spears and bows and arrows for several thousand years without significantly reducing their numbers, but the tiger's fortunes changed for the worse with the development of the flintlock gun in the 17th century. Tiger hunting was extremely popular during the time of British colonial rule in India in the 18th and 19th centuries, when excessive numbers were killed. After World War II and Indian independence, rifles became available to the poor as well as to the rich; hunting intensified as a booming international trade developed in tiger skins. However, although persecution posed a serious threat to the survival of the tigers, the increasing exploitation of Asia's tropical and subtropical forests was a much more important factor in the decline of their numbers.

## International action

In 1969 an IUCN (International Union for the Conservation of Nature and Natural Resources) congress passed a resolution that resulted in the Indian race of the tiger being listed as endangered in IUCN's Red Data Book. The tiger's plight was now recognized, but was there time to save it?

A remarkable concerted effort at conservation followed. The Indian government took the initiative by banning all



tiger hunting and the export of tiger skins. The conservationist Guy Mountfort proposed an international campaign to create and equip tiger reserves. This plan was received with enormous enthusiasm throughout the subcontinent and became known as Project Tiger. The Indian Prime Minister, Indira Gandhi, took a personal interest, setting up a special committee to coordinate action in India. By 1990 India had 18 Project Tiger reserves across the country. This commitment was matched by Bangladesh, Bhutan and Nepal, and important reserves have been set up here in excellent tiger areas. These include three reserves in the Sundarbans mangrove swamps of Bangladesh, one in the Bhutan Manas forest adjoining the Indian Manas reserve, and the Royal Chitwan National Park in Southern Nepal. HRH Prince Bernhard of the Netherlands, President of the World Wildlife Fund (World Wide Fund for Nature), launched an international appeal for funding in 1972. This created enormous public interest, and more than \$1 million was raised for tiger reserves. The attitude to

animal skins also changed; wearing a fur coat made from a rare animal's skin now arouses hostility instead of envy.

## Will the tiger survive?

The tiger has responded well to protection. The 1989 census in India recorded more than 4,000 individuals, but there are still problems to be overcome. Scientists believe that a population of tigers must total 500 animals for long-term viability. With the exception of the Sundarbans, the subcontinent's other protected areas are too small to support this number. Added to this, pressure is increasing on many existing reserves from cattle grazers and grass cutters, while suitable habitats elsewhere continue to diminish at an alarming rate. Conflict with local people is growing as some tigers leave overcrowded reserves to seek prey and attack domestic cattle in the surrounding area.

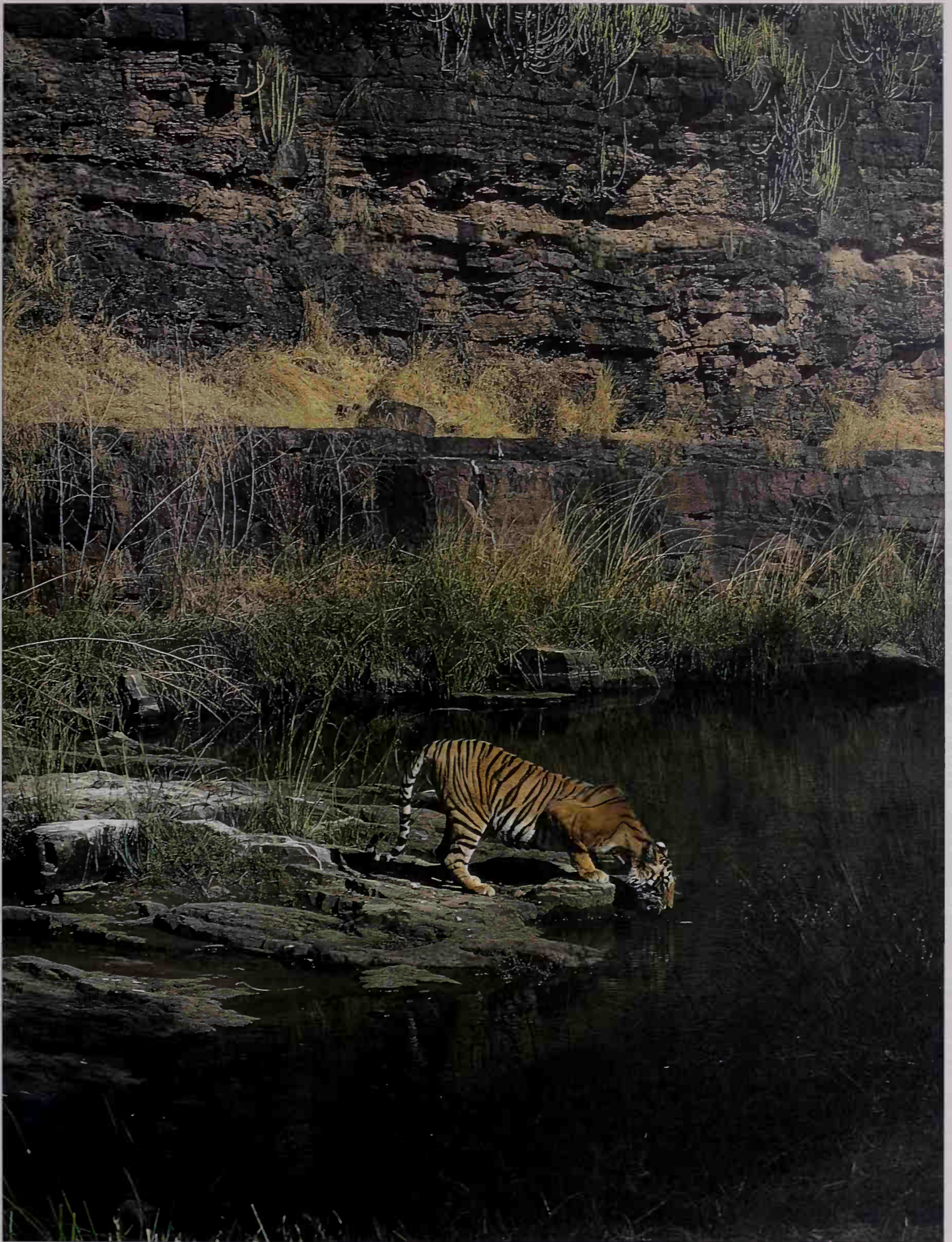
Project Tiger has given the tiger a new lease of life. The project has also benefited the many other wildlife species that inhabit the forest reserves: a precious part of the natural heritage has been protected.

**Hunting technique (above)** Taking advantage of all available cover, the tiger moves close to its prey, crouching low but keeping its head up. When it is within 20 m (66 ft) of its prey, the tiger confuses and panics its victim by rushing it from behind or from the side, lashing out with its paws. The tiger seizes the prey with its claws to bring it down. A bite to the throat or neck finally kills the prey by suffocation.

**Early learning (left)** These two cubs are being taught how, where and when to hunt by their mother. They will spend about 18 months with her before leaving to establish territories of their own.

**Free from danger (right)** A tiger drinks its fill at Ranthambor National Park. Tigers have been protected here for many years, and are often seen during the daytime.







# PLANT LIFE

FORESTS OF TEAK AND RHODODENDRON · CUSHION PLANTS AND FLOWERING TREES · PLANT USES AND ABUSES

Few regions can boast such a range of niches for plants as the Indian subcontinent. Woolly plants, hardy scrub and rhododendron forest grow on the world's highest mountains, the Himalayas, brilliant flowering trees light up dark deciduous forests, and the coasts of northeast India and Bangladesh are fringed with the mangrove swamps of the Ganges delta (the Sundarbans). There are dense rainforests on the Western Ghats in southwest India and in western Sri Lanka – rich in orchids and epiphytes – and thorn plants and succulents in the Thar Desert. Away from the mainland lie chains of palm-clad islands: Lakshadweep, the Maldives, and farther south the Chagos Archipelago, including Diego Garcia. These ancient coral reefs have few plants, but some species are found nowhere else in the world.

## COUNTRIES IN THE REGION

Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka

## DIVERSITY

	Number of species	Endemism
Bangladesh and India	15,000	33%
Bhutan and Nepal	7,500	10%
Maldives	260	2%
Pakistan	5,500	5%
Sri Lanka	2,900	30%

## PLANTS IN DANGER

	Threatened	Endangered	Extinct
Bangladesh and India	20	18	4
Sri Lanka	12	8	
Bhutan, Nepal, Pakistan	No current information		

**Examples** *Cycas beddomei* (Beddome's cycad); *Dioscorea deltoidea* (kin); *Diospyros oppositifolia* (opposite-leaved ebony); *Frerea indica* (frerea); *Lilium mackliniae* (Shirhoi lily); *Paphiopedilum druryi* (Drury's slipper orchid); *Prunus himalaica* (Himalayan cherry); *Saussurea roylei* (Royle's saussurea); *Ulmus wallichiana* (Wallich's elm); *Vanda coerulea* (blue vanda)

## USEFUL AND DANGEROUS NATIVE PLANTS

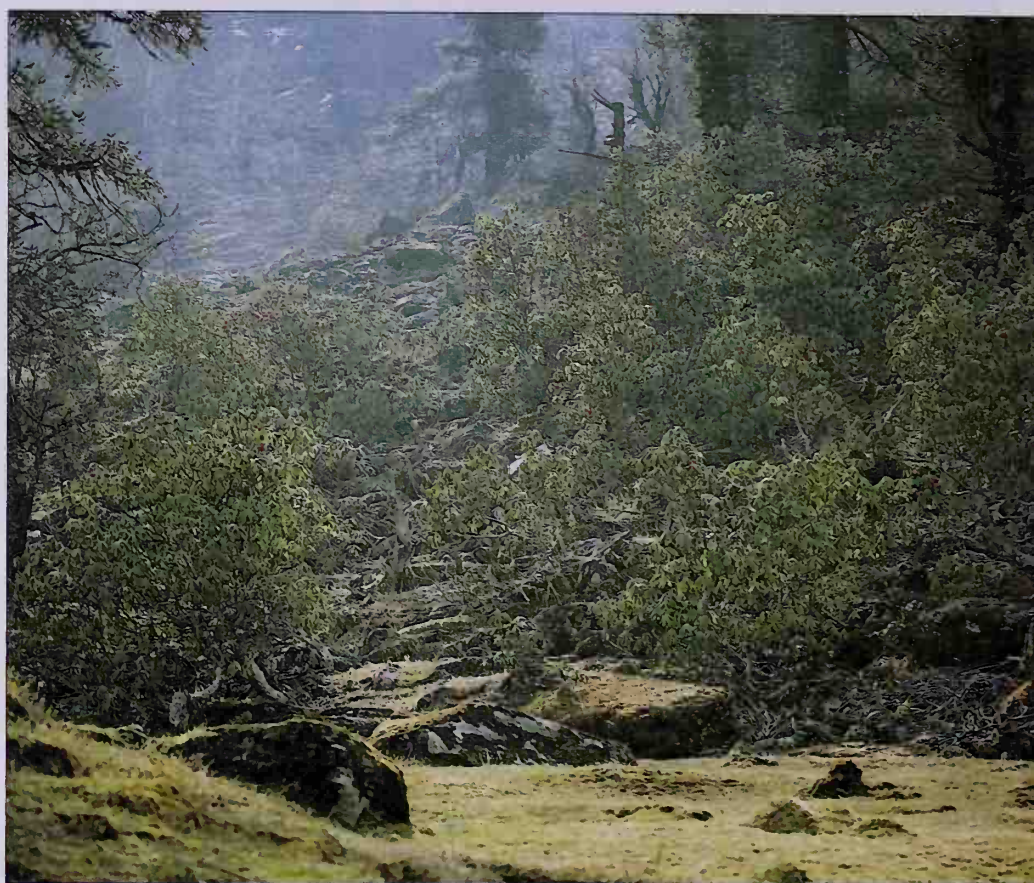
**Crop plants** *Cannabis sativa* (hemp); *Cinnamomum zeylandicum* (cinnamon); *Elettaria cardamomum* (cardamom); *Oryza sativa* (rice); *Piper nigrum* (pepper); *Saccharum spontaneum*; *Tectona grandis* (teak)

**Garden plants** *Buddleia crispa*, *Clematis montana*; *Corydalis cashmeriana*, *Delphinium* species; *Pleione humilis*, *Potentilla agrophylla*, *Rhododendron* species

**Poisonous plants** *Antianis toxicaria* (chandia); *Atropa acuminata* (Indian belladonna); *Buscus wallichiana* (boxwood tree); *Datura stramonium* (purple thorn apple); *Gloriosa superba* (glory lily)

## BOTANIC GARDENS

Calcutta (5,000 taxa), National Botanic Research Institute, Lucknow (6,000 taxa); Royal Botanic Gardens, Lalitpur (2,300 taxa); Royal Botanic Gardens, Peradeniya (4,000 taxa)



## FORESTS OF TEAK AND RHODODENDRON

When the Indian subcontinent broke away from the ancient supercontinent of Gondwanaland, it probably brought with it tall conifer trees and podocarps that had evolved in largely temperate conditions. However, in response to the continent's new, largely tropical position, and to changes in the topography as the mountains eroded, a new plant life evolved. Plants came primarily from the east, and to a lesser extent from Africa. Today the subcontinent is dominated by families that are found in southeast Asia and probably made their way to the subcontinent through Assam in northeast India.

### Mainland forest and scrubland

Most of the subcontinent receives an equable 500–2,000 mm (20–80 in) of rain each year. Where this falls relatively evenly throughout the year, as on the Western Ghats and in western Sri Lanka, rainforest flourishes.

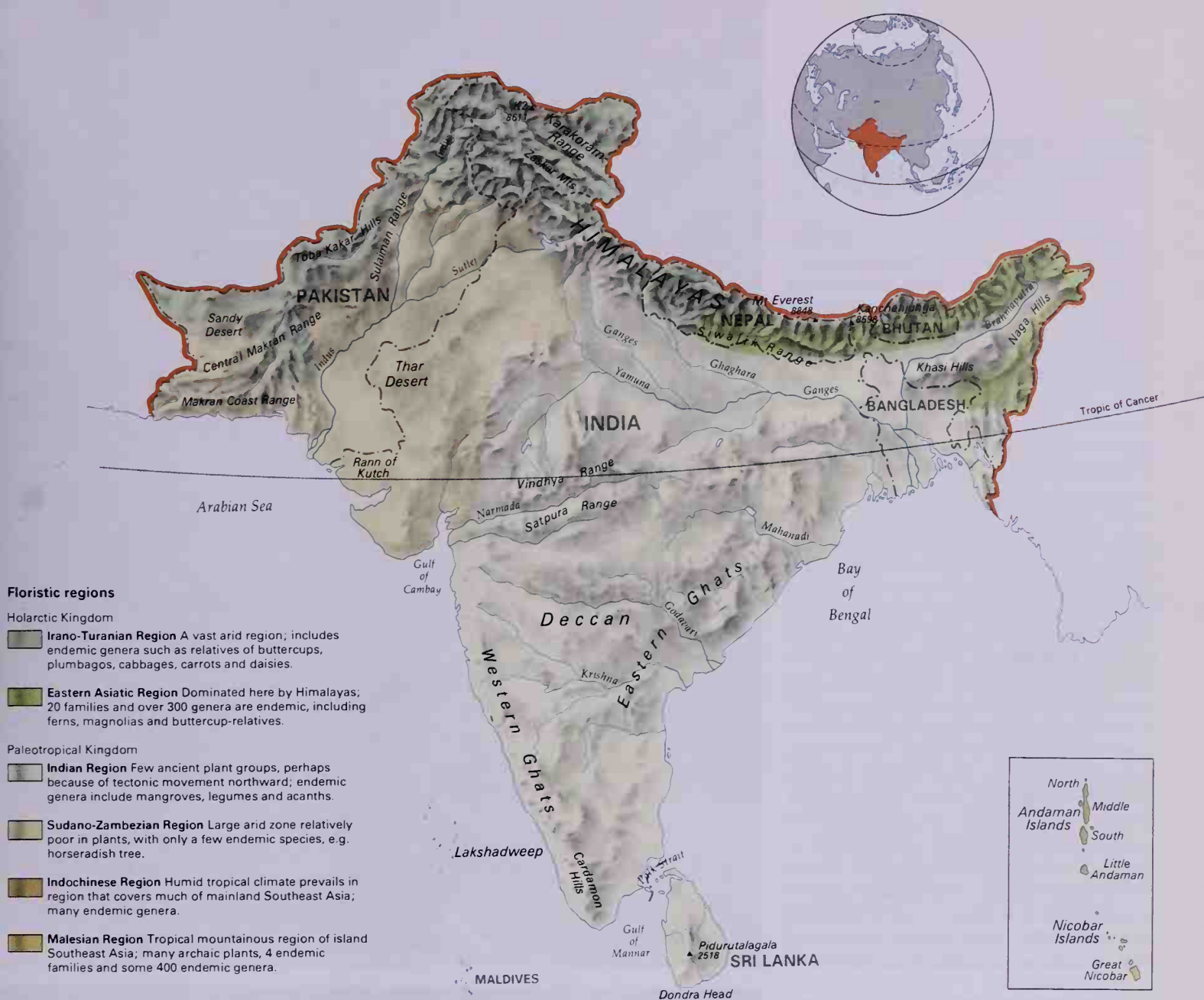
These forests support a great diversity of species. The Western Ghats alone has about 1,500 species found nowhere else

**Rhododendron forests in the Himalayas** Tallgrowing rhododendrons like red *R. arborea* and *R. hodgsoni* grow in the forests alongside junipers and magnolias, while at high altitudes bordering the alpine meadows more scrubby species, such as yellow-flowered *R. anthopogon*, are common.

(endemics), including the spreading banyan tree (*Ficus benghalensis*). It also supports wild species of commercial crops, such as pepper (*Piper*), banana (*Musa*), cardamom (*Elettaria*), ginger (*Zingiber*), the beautiful ginger lilies (*Hedychium*) and several species of tuberous aroid, including the over-collected *Arisaema*. The wet tropical hills of Assam have about 2,000 endemic species; they represent a rich transition zone between the plants of Indochina and those of the subcontinent.

In most of the region there are one or two dry seasons separated by monsoon rains. Deciduous or monsoon forest thrives in these conditions. The deciduous forests contain many species of flowering trees, such as *Erythrina indica*, with its spectacular red flowers, the orchid tree (*Bauhinia purpurea*), and the fragrant-flowered *Gardenia*. Some of these forests are dominated by teak (*Tectona grandis*), particularly in Madhya Pradesh





in central India, or sal (*Shorea robusta*) in the north. In areas of low seasonal rainfall, as in the arid Deccan peninsula, only savanna and scrub vegetation can grow, and *Acacia* thorn forests predominate.

In the far north of India, scrubby plants and succulents grow in the extremely dry, cold conditions. The rich plant life of the Himalayas totals about 9,000 plant species. Very small, squat, resilient plants, such as the woolly snowball (*Saussurea tridactyla*), and species of *Diapensia*, grow at the highest altitudes. Below these, in relatively arid areas, are temperate plants such as birch (*Betula*) and willow (*Salix*). The moister upper slopes support rhododendron forests and *Magnolia* species. Lower still coniferous forest, in which oaks (*Quercus*) also grow, clothes the mountain slopes.

The foothills of the Himalayas are covered with a wealth of coniferous trees

such as juniper (*Juniperus*), pine (*Pinus*), larch (*Larix*), fir (*Abies*), cedar (*Cedrus*), spruce (*Picea*) and hemlock (*Tsuga*). In some areas these trees grow in single-species communities; elsewhere they are mixed with oaks and chestnuts (*Castanea*).

In northeast Pakistan, near the headwaters of the Indus and its tributaries, typical species include the deodar (*Cedrus deodar*), blue or Nepalese pine (*Pinus wallichiana*) and chir pines (*P. roxburghii*), Himalayan fir (*Abies pindrow*) and Himalayan spruce (*Picea smithiana*).

#### Plants of the islands

In the rainforest of southwestern Sri Lanka, the true cinnamon (*Cinnamomum zeylandicum*) and the kaluwara or Sri Lankan ebony (*Diospyros ebenum*) grow. This area is rich in endemics, including tree species of *Shorea* and *Ficus*. Epiphytes – plants that grow on other plants

**Map of floristic regions** The plant life of most of the Indian subcontinent reflects its largely tropical climate; the plants of the north have adapted to arid conditions.

but are not parasitic – such as shrubby *Medinilla* species and orchids abound. The terrestrial foxglove orchid (*Phaius wallichii*) and the daffodil orchid (*Ipsea speciosa*) both occur nowhere else.

The natural plant life of Lakshadweep, the Maldives and the Chagos Archipelago comprises she-oak (*Casuarina*), mixed coconut or lettuce tree (*Pisonia*) woodland, *Scaevola taccada* scrub, marshland, and a few areas of broadleaf woodland, with *Ficus*, *Morinda citrifolia* and beach almond (*Terminalia catappa*). Much of the plant life on the larger islands has been replaced by coconut plantations, but the smaller islands retain some elements of their natural vegetation in a relatively undisturbed state.



## CUSHION PLANTS AND FLOWERING TREES

The plants of the Indian subcontinent have had to adapt to extreme conditions – notably very high altitudes and marked seasonal changes in climate. Two of the subcontinent's most remarkable plants are also among its smallest. They are a sandwort, *Arenaria bryophylla*, and a stitchwort, *Stellaria decumbens*, which contend for the title of the highest altitude plant in the world. They have been found at 6,100–6,200 m (20,000–20,340 ft), the sandwort growing on Mount Everest.

The environment where these plants grow is incredibly harsh, with freezing temperatures every night and most of the day; conditions are made worse by very strong winds and poor soils with few nutrients. However, the plants have adapted to overcome these difficulties in several ways. Both are cushion plants that grow in very dense, rounded mounds of short, many-branched stems. The wind passes over these cushions rather than through them, so less water is lost through the drying effect of the wind (desiccation). Because the plants are so compact, the temperature at the center of the cushions is slightly higher than that of the surrounding air; this makes it easier to withstand the intense cold. The plants also retain their dead leaves, which provide a source of nutrients in an otherwise nutrient-poor area.

Many other plants have remarkable ways of coping with life at high altitudes. Some have hairs on their leaves and stems – the snowball plants (*Saussurea*) have dense, long white hairs over their stems, leaves and flowers. These are thought to protect the plant against either high daytime temperatures, the intense ultra-violet radiation found at high altitudes or the effects of frost and freezing.

### Flowers in the dry season

In many lowland areas there is a distinct hot, dry season. The trees adapted to this climate tend to be deciduous; they lose their leaves in the dry period, and produce their flowers after leaf-fall. This early flowering means that the fruits will begin

**Epiphytic orchid** *Coelogyne cristata* grows in the cloud forests of the Himalayas. It clings to bark or mossy rocks by means of specialized roots. It has a creeping rhizome from which arise pseudobulbs, succulent organs for storing water and nutrients.







**Screw-pines on the Maldives** The lower trunk is surrounded by a cage of aerial prop roots, which give support and are also a response to periodic flooding by the sea. Screw-pines are not pines or palms, but monocotyledonous trees.

to ripen by the time the rains come; the seeds are then dispersed, and germinate in favorable growing conditions. As the seedlings grow they are shaded by the canopy of new leaves on surrounding trees, so the young plants have a chance to become established before the onset of the next dry season.

*Firmiana colorata* is a typical deciduous tree that has adapted to the dry season. Its clusters of bright coral red, tubular flowers, which produce copious nectar, are rendered even more conspicuous by appearing on leafless branches. Flowers of this kind are particularly attractive to birds, in this case to sunbirds and bulbuls, which act as pollinators.

The silk cotton tree (*Bombax ceiba*) is

also pollinated by birds. It too produces its spectacular display of large red flowers on leafless branches; in common with many of these trees, the leaves are not invariably shed – they are retained if the trees grow in moist areas, dropping only when the new leaves form in March. The silk cotton tree has developed a number of other adaptations for its survival. Its fruits open before they fall, revealing seeds that are covered with silky hairs (giving the tree its common name), which are caught and dispersed by the wind. The bark of the young tree is covered with conical prickles that discourage predators – though they disappear as the tree grows older. The young branches of *Erythrina indica* also bear prickles that are dropped after two or three years.

The trees *Dillenia pentagyna*, of the northern sal forests, and karmal (*Sterculia guttata*) also flower before the new leaves unfurl. The flowers of karmal trees are a

#### PERADENIYA BOTANICAL GARDENS

The Peradeniya Botanical Gardens in Sri Lanka lie some 100 km (60 mi) east of the capital, Colombo, just outside the royal town of Kandy. The first gardens on the site were founded by King Kirthi Sri in the mid-18th century. The colonial Dutch and British governments later established the botanical gardens, which were subsequently developed into the striking formal gardens of today. Their setting, on rolling hills in the horseshoe curve of the Mahaweli, the longest river in Sri Lanka, is dramatic in itself.

In March and April the gardens become luminous with displays of flowering Sri Lankan trees, such as the murutha (*Lagerstroemia speciosa*), with its large candles of mauve flowers, the yellow poiciana (*Peltophorum inerme*), with its masses of yellow blooms, and the na or ironwood (*Mesua nagsarium*), which has scented white flowers and, at other times of the year, bright crimson new leaves.

The medicinal garden is of particular interest – it contains about 300 of the 500 or more species of plants used in the traditional medicine of Sri Lanka. Among them is the snakeroot (*Rauwolfia serpentina*), which has long been used to relieve the effects of snake bite. It is now used in Western medicine in the drug reserpine, which is derived mainly from the roots of the plant, and is used to lower blood pressure.

livid purple, and have a strong smell that attracts carrion flies and fruit flies, which perform the task of pollination.

Deciduous forests composed almost entirely of sal trees grow along the base of the Himalayas, and in the northeast and southeast of the Deccan. The hardwood trees are extremely resistant to fire – a constant threat in the hot, dry conditions. Like most trees that grow in areas with a distinct dry season they are deciduous, but they are never quite leafless; the young foliage appears in March along with the flowers. The seeds ripen three months later and sometimes germinate before they are released, so that once they land on the ground they can quickly become established.

In the drier parts of the western Deccan *Hardwickia binata* flourishes. Its seedlings cope with the difficulties of finding enough water by producing a taproot an amazing 3 m (10 ft) long.





## PLANT USES AND ABUSES

The Indian subcontinent contains 18,000 or so species of flowering plants, a large number of which are used for a variety of purposes, or are of horticultural value all over the world. Many plants of the Himalayas, for example, are now so familiar to gardeners in temperate regions that their genus names have entered the vernacular. They include clematis, aster, delphinium, aquilegia, geranium, iris, primula, mahonia, and the Himalayan balsam and busy lizzie (*Impatiens*).

The forest trees are also used for a multitude of purposes. In India alone, minor products (everything except timber) such as pharmaceuticals, resins, gums, oils and bamboo (widely used in the construction industry and for furniture) probably account for roughly half of the country's net revenue from the forestry sector. However, the plant life of the region is very seriously threatened by the

excessive requirements and rapid expansion of the human population.

### Multipurpose plants

Among the many species with a number of uses are the palms, and in particular the talipot or umbrella palm (*Corypha umbraculifera*), so called because up to 15 people can shelter beneath a single leaf. The leaf bases of this tree provided the "paper" for important manuscripts and government documents; there are examples in museums that are over 1,000 years old. Twine from the dried young leaves can be made into fishing nets and mats. In addition, the roots are beneficial as a treatment for diarrhoea, sago flour can be extracted by rinsing the pith, and sugar can be tapped from the enormous flower stems (8 m/26 ft tall) just before the flowers open.

Another multipurpose plant widely used in rural areas is the soapnut (*Sapindus laurifolius*). As its common name suggests, the fruit contains the soapy

**Mango trees grow wild** in the forests of Assam. The conspicuous inflorescences of the musk-scented flowers are pollinated by bats. *Mangifera indica* is the only mango in cultivation, though other species bear luscious fruits that are eaten locally.

alkaline substance saponin, which is a substitute for soap. But this is not all. The root can be taken as an expectorant to relieve catarrh, and the seed kernels are given as pessaries to stimulate contractions of the uterus in childbirth.

The sohnja or drumstick tree (*Moringa oleifera*) of the western Himalayas is widely cultivated for the gum that can be obtained from the fruits. (It is similar to gum tragacanth, obtained from species of *Astragalus*.) A clear oil (ben oil) is extracted from the seeds and used as a lubricant and in perfumery.

### Timber trees under threat

Timber is the most valuable plant commodity in the region, with teak particularly in demand. It is one of the world's finest, heaviest timbers, and is



especially favored for boatbuilding because it resists certain burrowing marine mollusks. The timber of sal, which is highly resistant both to rotting and to attack from burrowing animals, is used to make railroad sleepers for the subcontinent's vast rail network.

Among the important Sri Lankan timber trees are burutha or satinwood (*Chloroxylon swietenia*), which has beautifully patterned yellow wood; the kaluwara or Sri Lankan ebony, with its black heartwood, which is greatly favored by wood carvers and cabinetmakers; and the true cinnamon, prized for its bark, which is exported mainly to Europe where it is used in cooking.

Despite the commercial importance of trees, in most countries of the region less than 15 percent of the land has any form of forest cover, and much of that is degraded. Roughly one percent of the remaining forests are being lost each year, generally to inappropriate forms of extensive agriculture. In areas with an abundance of species, such as the Western Ghats and southwestern Sri Lanka, steady loss of the forests, sometimes even within protected areas, threatens the longterm viability of some populations of endemic species, and extinction may be only a few decades away.

In some areas, such as Kashmir in the north, there are fine stands of deodar. However, the young trees will probably be the last generation to grow into stately trees. Uncontrolled cattle grazing and the collection of firewood have removed most of these saplings, so there is no regrowth.

A similar problem faces the forests of Baluchistan in Pakistan. The area was once covered in seemingly endless juniper forests, but now stands of stumps are all that remain of much of these forests. The trees were taken for fuelwood, which provides more than 50 percent of domestic energy needs for 75 percent of the people of Pakistan. When the population was small the trees were able to regenerate, but as it has increased, so has the demand for wood.

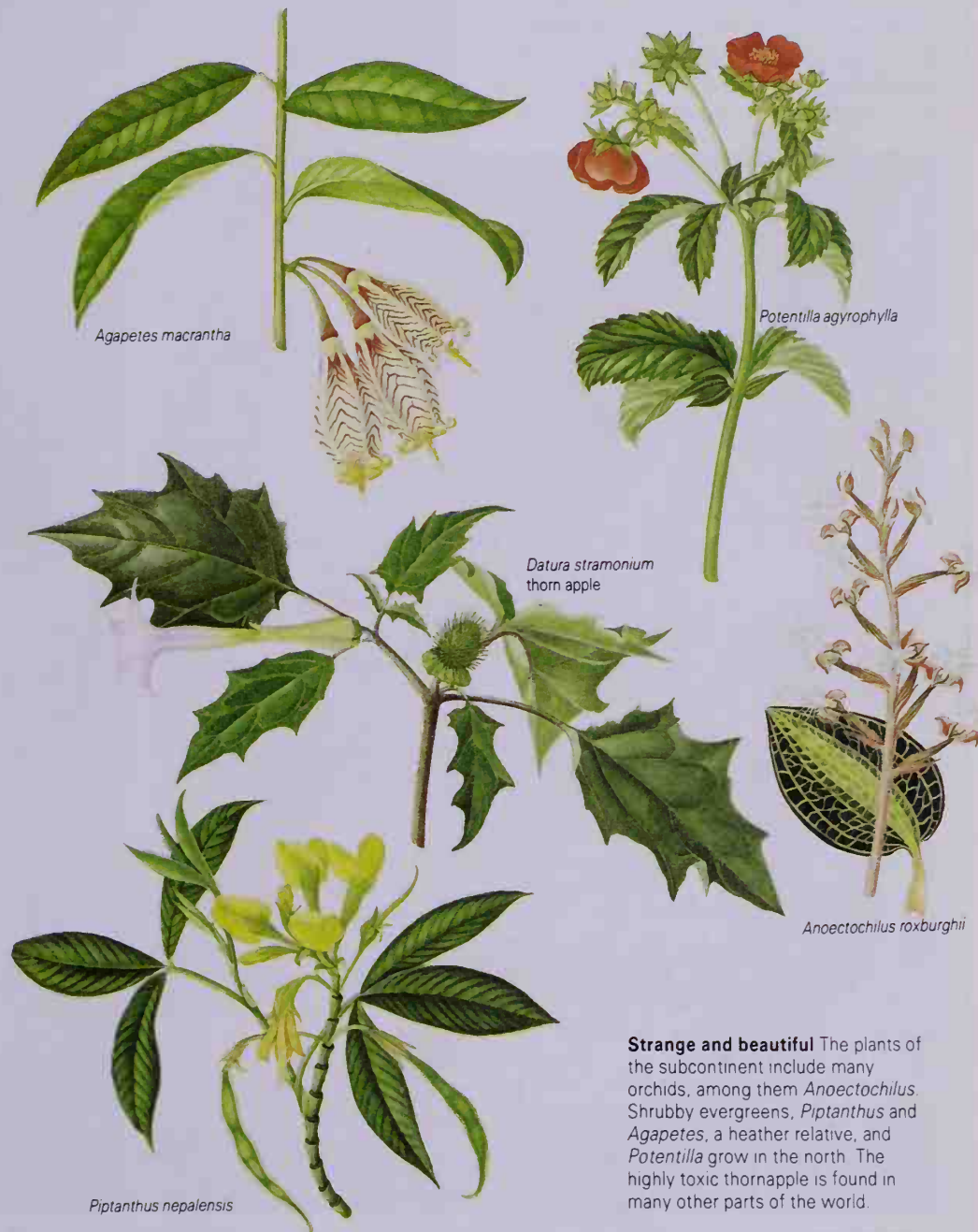
Uncontrolled cutting of the trees for fuel on the small islands off the south and southwest coasts of India has made fuelwood a scarce commodity there as well. In recognition of this problem, the Maldives government launched a largescale tree-planting program. Many more of these programs are needed if the forests are to survive into the future.

## THE MEDICINAL PLANTS OF INDIA

As many as 2,500 species of plants in India are believed to have some medicinal properties. More are being discovered in the wake of a government program that is investigating the reasons for the cures these effect. The enormous task of documenting the uses of India's plants was first tackled at the end of the 19th century. The findings were published between 1889 and 1893 in the *Dictionary of the Economic Products of India*, a nine-part, 5,000-page work that still forms the basis of what is known today.

Much of this dictionary reads like an

old herbal, with innumerable cures for headaches and gastric disorders. However, some concoctions are recommended for remarkably specific conditions; for example, maidenhair fern (*Adiantum*) prevents baldness; bamboo leaves mixed with black pepper stop diarrhoea in cattle; the milky sap of banyan trees softens cracked skin on the soles of the feet; delphinium roots kill maggots in goat wounds; and charred teak wood, soaked in poppy juice and pounded into a smooth paste, relieves swollen eyelids and improves the sight.



**Strange and beautiful** The plants of the subcontinent include many orchids, among them *Anoectochilus*. Shubby evergreens, *Piptanthus* and *Agapetes*, a heather relative, and *Potentilla* grow in the north. The highly toxic thornapple is found in many other parts of the world.



# The Sundarbans

The mangrove forests of the Sundarbans are the most extensive in the world. They cover more than 4,000 sq km (1,540 sq mi) of the Ganges Delta in Bangladesh and northeast India, and have been protected for more than a century.

## Swamp survival

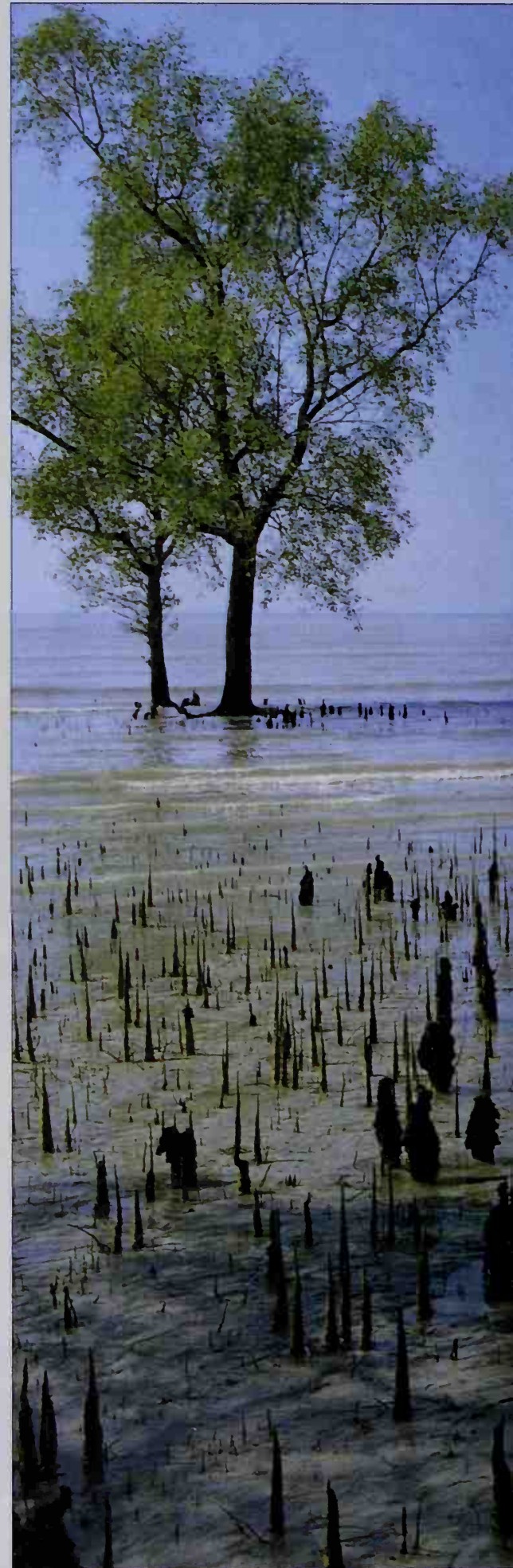
The Sundarbans forest mainly consists of species typical of the less salty, landward fringes of most Asian mangrove swamps. It differs from most swamp forests, probably because of the enormous volume of fresh water that is brought down by the Ganges, Brahmaputra and lesser rivers, reducing the water's saltiness. It is similar in that it contains relatively few plants other than trees.

The main forest species is sundri (*Heritiera fomes*) – the origin of the name Sundarbans, previously "Sundribans". It is mixed in places with small trees such as

## Where the forest meets the sea

The Sundarbans covers much of the vast delta of the Ganges. The sacred river of India, the Ganges rises in the Himalayas, as does the Brahmaputra. These two, and a number of other lesser rivers and tributaries, bring an enormous volume of fresh water down from the mountains, giving a unique character to the mangrove forests of the Sundarbans. Here the trees have evolved vertical pneumatophores, which are exposed at low tide to "breathe"; when the tide comes in the breathing pores close to prevent the entry of water.

**Inside the Sundarbans** In the forest, marked by an absence of lianas and few epiphytes, sundri grows with *Nipa fruticans*. This stemless palm of tidal swamps has large fruits up to 30 cm (1 ft) in diameter, which float on the sea to be dispersed.







gewa (*Excoecaria agallocha*) and goran (*Ceriops decandra*). In the Sundarbans the sundri has vertical, woody extensions (pneumatophores) on its root system that project above the ground, though in other parts of its range these are absent. The pneumatophores have pores (lenticels) and specialized internal tissue that enable the plant to breathe (exchange gases with the surrounding air). The height of the pneumatophores varies from area to area, depending on the heights reached by the tides. The roots of gewa trees also project above the ground in small loops or "knees" of the horizontal roots below ground. (Gewa trees have copious white sap that is poisonous, and can cause blindness if it touches the eyes.)

Goran trees do not have specialized roots to cope with waterlogged soil and wave action, but they do have lenticels in their bark through which gases can be exchanged. They are members of the true mangrove family and, like other species, produce fruit with seeds that germinate while still on the tree. The young root (hypocotyl) that develops from the seed is robust, heavy and pointed; when the seed is released, the root therefore stands a good chance of penetrating the mud if the tide is out.

#### An endangered habitat

The devastating floods experienced in Bangladesh during the 1980s initiated a wide range of engineering projects to keep the water within the riverbanks and away from the densely populated floodplains. As a result, the original pattern of flow of fresh water through the innumerable channels has changed, and it is possible that this has caused the sundri trees to die back in some areas. The trees, which are the source of a very hard timber, have been felled at a greater rate than their slow growth can sustain. Goran trees too are felled, and are used for firewood, boatbuilding, tanning and houseposts.

Given that these practices are continuing, it seems unavoidable that there will be changes in the forest ecosystem. These are likely to be compounded by the effects of global warming and the predicted rise in sea levels. In recognition of these threats, there are moves to have the whole of the area covered by mangrove forest declared an International Peace Park, which would be administered jointly by Bangladesh and India.



# AGRICULTURE

ENVIRONMENTAL INFLUENCES · A FARMING WAY OF LIFE · FOOD FOR THE MILLIONS

Agriculture has been practiced in the Indian subcontinent from very early in human history, and many of its peasant farmers still maintain a farming technology and way of life that has changed little over the millennia. Its earliest origins are unclear, but in the hot dry valley of the lower Indus the people of the Mohenjo Daro civilization (2500–1600 BC) are known to have grown barley and wheat, irrigating it with river water. In the more humid east, shifting cultivation was practiced, and still survives in some remote hill districts. Elsewhere it was replaced by rice farming. In the coastal areas of the Bay of Bengal coconuts have long been important, providing food, fibers, and wood for building. In the dry interior coarse millets are grown, and cattle, sheep and goats are grazed by both settled and seminomadic groups.

## COUNTRIES IN THE REGION

Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka

## Land (million hectares)

Total	Agricultural	Arable	Forest/woodland
413 (100%)	223 (54%)	198 (48%)	80 (19%)

## Farmers

258.7 million employed in agriculture (66% of work force)  
0.9 hectares of arable land per person employed in agriculture

## Major crops

Numbers in brackets are percentages of world average yield and total world production

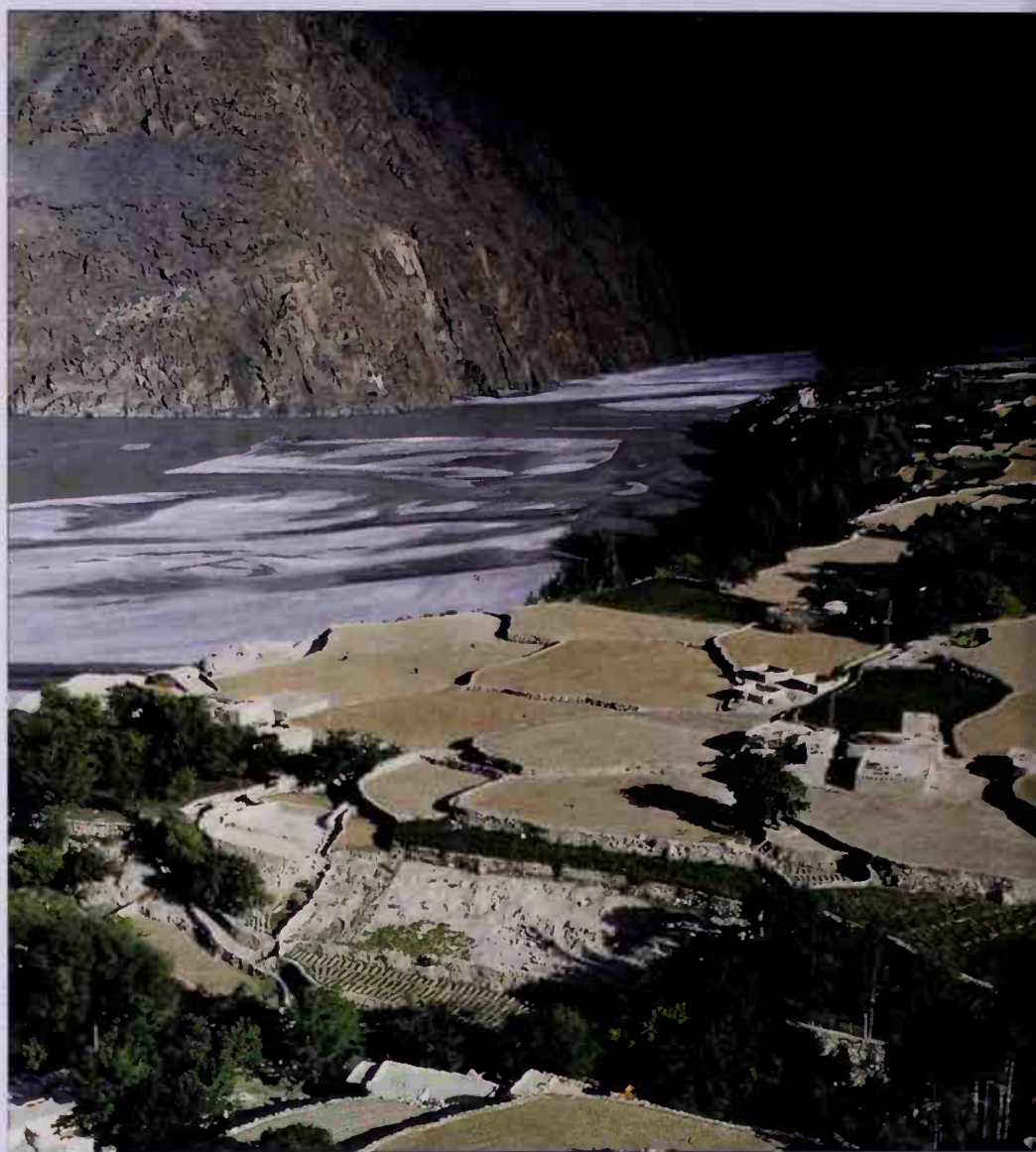
	Area mill ha	Yield 100kg/ha	Production mill tonnes	Change since 1963
Paddy rice	52.7	22.3 (68)	117.7 (25)	+61%
Wheat	32.0	18.2 (78)	58.2 (11)	+274%
Millet/sorghum	30.3	6.3 (55)	19.1 (21)	+10%
Pulses	24.9	5.3 (66)	13.2 (24)	+3%
Cotton lint	9.1	2.8 (52)	2.6 (16)	+81%
Maize	7.2	10.9 (30)	7.8 (2)	+30%
Groundnuts	6.8	8.4 (73)	5.8 (27)	+11%
Sugar cane	4.1	539.5 (90)	222.4 (23)	+73%
Vegetables	—	—	53.0 (13)	+107%
Fruit	—	—	30.3 (9)	+94%

## Major livestock

	Number mill	Production mill tonnes	Change since 1963
Cattle	247.4 (19)	—	+15%
Sheep/goats	235.8 (14)	—	+74%
Buffaloes	93.7 (68)	—	+48%
Milk	—	25.2 (5)	+158%
Fish catch	—	4.4 (5)	—

## Food security (cereal exports minus imports)

mill tonnes	% domestic production	% world trade
-2.1	1	1



## ENVIRONMENTAL INFLUENCES

Water storage and irrigation have a long association with farming throughout the Indian subcontinent, where the rainfall is highly seasonal and in places unreliable; in addition some staple crops, notably rice, make high demands on water. The region embraces an extraordinary diversity of environments, including some of the world's highest mountains, tropical rainforests, hot sandy deserts and extensive river plains. It can, however, be divided into three main areas for agriculture: the triangular Deccan peninsula in the south and center; farther north, the vast plains formed by three large rivers, the Indus, the Ganges and the Brahmaputra, and their tributaries; and, in the extreme north, the

**Exploiting the land** Throughout the subcontinent farmers exploit almost every available piece of land. High in the Karakorum mountains on the border of India and Pakistan they store water from the summer snowmelt to irrigate their terraced fields.

Himalayas, which form an important dividing line for civilizations, climates and agricultural practices.

In the fertile, irrigated valleys of the west and central Himalayas rice is grown; on higher slopes, as temperatures fall, harder crops are planted, predominantly maize and barley. Commercial orchards for almonds and apricots are common in the lower valleys, particularly in Kashmir in the northwest; at higher altitudes apples are grown. Above the treeline animal husbandry is important, with yaks providing transport, milk and butter.

The great plains of the northern subcontinent, where the greatest densities of





Irrigation is less essential all year round in the center and east of the plains, where much heavier and more reliable monsoon rain falls. In the lower Ganges monsoon rice is chiefly grown in flooded paddy-fields. Where rainfall is unreliable, the rice is transplanted from small, irrigated

Coconuts are the principal crop of the Maldives, together with millet, breadfruit and tropical fruits and vegetables, some of which are exported. Fishing is the major industry; locally caught tuna and other fish are canned or frozen for export.

As well as cattle there are millions of buffaloes (a major producer of milk), goats and sheep. Fodder is scarce, mostly consisting of the residue from harvested crops, so animal health is generally poor. This is one reason why plows are simple and do not turn the soil deeply, and also why milk yields are low: 700 kg (1,543 lb) per cow per year in India compared with 4,000 kg (8,800 lb) in Western Europe. It has been estimated that present fodder resources are sufficient to feed adequately only two-thirds of India's livestock. Most people here are vegetarians and, since cows are venerated, they are usually allowed to die a natural death. Although India is a major exporter of cattle hides, it in fact exploits only a small part of this market because touching carcasses is regarded as unacceptable, except for those of the lowest status of caste.



## A FARMING WAY OF LIFE

Most people in the Indian subcontinent are involved in farming. It provides 92 percent of employment in Nepal and Bhutan, 71 percent in Bangladesh, 68 percent in India, 53 percent in Sri Lanka and 52 percent in Pakistan.

Nearly all types of farming are involved, much in subsistence cultivation. Most farmers are tenants who rent land for cash; some are short-term sharecroppers who rarely take home half the crop they grow. Those who are landless may receive payment in food, but this is now declining in favor of cash wages.

Peasant cultivators are sometimes freeholders, though they generally possess little land. Most holdings are fragmented into tiny plots. In the Indian Punjab, for example, in the northern plains, an average holding is about 4 ha (10 acres), and will be divided into four or five plots, whereas in Bangladesh, with its high density of population, an average holding of perhaps 1 ha (2.5 acres) may be split into as many as 12 or 15 plots. In just a few places on the subcontinent there are major plantations or estates, nearly all producing crops for export.

The task of feeding the subcontinent's rising populations thus falls on an overwhelmingly peasant workforce, farming the land with mainly traditional methods. The land under cultivation is unevenly distributed; a very large percentage of farmers are concentrated on a very small amount of the total area. Small farmers are hampered by a lack of credit, and the land tenure system provides little incentive for improvement.

### Staple grains

Rice is the most important food crop throughout the region. It occupies about one-third of all the land under food grains. In traditional agriculture the same variety is never planted twice running on the same plot. This inhibits the buildup of pests and diseases, as each variety has differing resistance to pests, virus diseases, fungi and drought. A farmer in Bangladesh may consequently have 15 or 20 varieties in store for planting on his 10 or so plots, each of them suited to the local microenvironmental conditions. In the state of Bihar, in northeast India, alone there are thought to be tens of thousands of local rice varieties in cultivation.



In the 1960s high-yielding varieties of rice, bred to be responsive to fertilizers, were introduced as part of the Green Revolution. Greater use of fertilizers, pesticides, insecticides and irrigation also formed part of this program to modernize agricultural practices and to make each country in the region self-sufficient in food. Wheat production – the region's second grain crop, occupying one-fifth of the area under grain in India – increased rapidly in the early years of the Green Revolution, helped by the expansion of irrigation in the wheat-growing areas. This was made possible by new canals, and by using electric or diesel-powered tube wells to pump groundwater from much deeper beneath the surface than traditional wells could do.

**Tea picking** India is the world's largest producer of tea. The best tea grows in warm climates at altitudes of 1,000–2,000 m (3,000–7,000 ft). The tea plant takes 3–5 years to mature, after which the flushes – new shoots – are picked.

Pulses, mainly gram (chickpeas) and lentils, are the most common source of protein in India, though fish is eaten in coastal and river areas. Beef and mutton are also eaten in Pakistan and Bangladesh. Pulses are agriculturally advantageous, as they are able to fix nitrogen in their roots, and so enhance soil fertility. They are intercropped with millet in the Deccan peninsula. Other grain crops include sorghum, maize and barley.

Fruit and vegetables are grown for domestic consumption in gardens surrounding most villages. Since packaging



and preservation is little developed in the subcontinent, supplies of fresh produce – including meat, milk, vegetables and fruit – have to be immediate. This means that towns take up the surplus of local farmers, who often undertake the marketing themselves. Goats and chickens are taken live to the market and slaughtered on the spot if there is a buyer. Milk from stall-fed cows kept in urban areas is supplied direct to the consumer from churns carried on bicycles. Fodder for the cattle is imported from the countryside – often in loads balanced on the head.

### Crops for cash

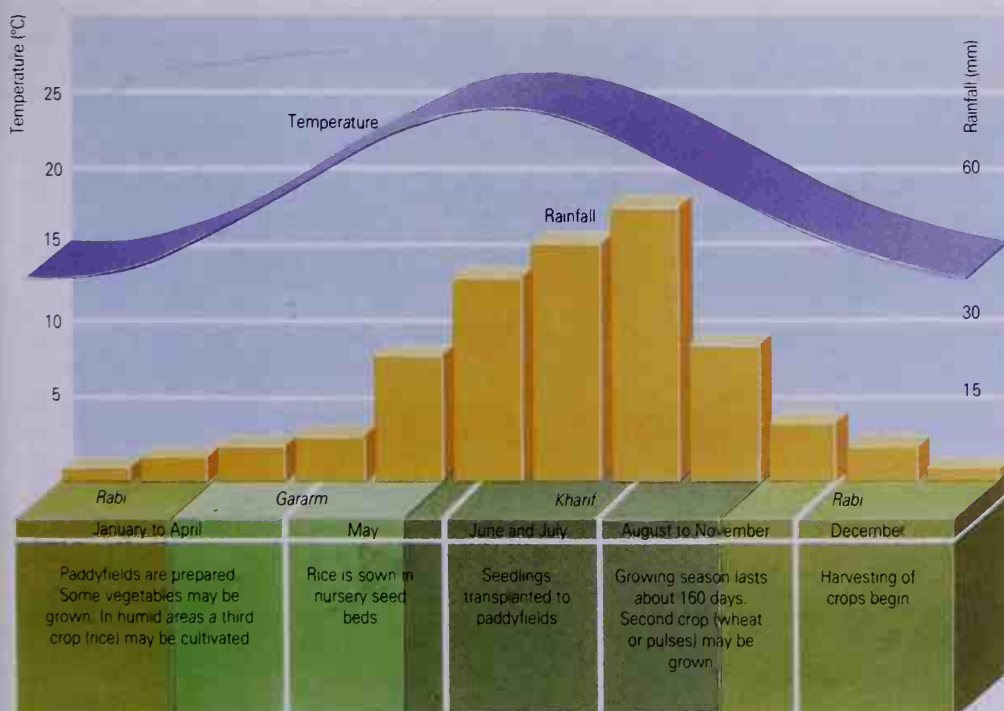
India is a major producer of tea, pepper, groundnuts and sugar cane, grown for domestic use and for export. Other significant cash crops are coffee, coconuts, cotton, jute and tobacco. Coconuts provide both food and fiber (coir), most of the latter for export. Sri Lanka is a particularly important producer of this commodity; it also grows pepper and other spices for export. Coffee production, for the domestic market, is restricted to south India; rubber, produced on larger plantations in both south India and Sri Lanka, is sold locally and exported.

Tea is grown on large estates in the mountains of northeast India, northern Bangladesh and Sri Lanka. In the past these estates were notorious for their abuse of migrant laborers, and they still pay their workers extremely low wages.



**Timeless agriculture** (above) Farming technology in much of the region has altered little for thousands of years. Many operations, such as winnowing wheat, are still performed by hand.

**The farming year** (below) In the Ganges delta a pattern of farming has developed to exploit the high rainfall of the monsoon season, when fields can be flooded for rice planting and growing.



### THE THREE-SEASON YEAR

The natural vegetation of much of the Indian subcontinent is tropical deciduous; the trees drop their leaves not (as in temperate regions) when it is cold, but in the hot season when conditions become arid. This characteristic cycle is reflected in the agricultural practices of the region, where there are three distinct seasons of the farming year: *kharif*, *rabi* and *garam*.

The season of rains, known as *kharif* – lasting from late May or early June until September – is the time for planting wet, or monsoon, rice: it is grown in flooded paddyfields, standing in depths of 5 to 10 cm (2 to 4 in) of water. The rains are then followed by the cooler, dry *rabi* – from October to about late February – when cereal crops such as wheat, requiring smaller amounts of water and plentiful sun, and pulses are grown. The third season of the year, *garam* – meaning “hot” or “heat” – lasts from the end of February until June. In the Ganges valley a searing wind known as the *loo* may start: if crops are not gathered in by then they will become parched and withered. In some humid coastal areas it is possible with the aid of irrigation to cultivate a third crop, usually rice, in this season.





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## FOOD FOR THE MILLIONS

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Since 1947, when India and Pakistan gained their independence, the population in each country within the region has at least doubled, putting immense strain on food self-sufficiency. In India, for example, the population grew at an annual rate of 2.8 percent for the first 20 years after independence, unmatched by similar increases in food output. By the mid 1960s several areas had experienced near famine and the country was dependent on cereal imports, mostly of wheat from North America. Population growth rates have since declined, and the rate of increased food output has begun to rise; as a result, imports are no longer needed in most years.

Pakistan, too, started to face food deficits in the 1960s as government policy to keep food prices low in the cities depressed farm output. In the early 1980s, however, the trend began to reverse, and there was a dramatic rise in rice production. By the end of the decade it was accounting for 8 percent of all exports.

The increases in food production were largely due to the adoption of new high-

yielding strains of cereal plants and new fertilizers, but the Green Revolution, for all its successes, has had mixed results. The new varieties of dwarf rice, with their shorter stems for greater strength so that the ear can grow fatter without the plant falling over, proved unsuitable for areas that were frequently deeply flooded. Many of the early new varieties were susceptible to pests and diseases. Not only was this an inherent characteristic, but because the varieties were not constantly rotated, as they are in traditional farming methods, conditions were created that allowed nonspecific diseases to flourish, necessitating the use of even more pesticides and fungicides.

In the initial stages of the Green Revolution it was thought that the new technology, together with the increased cost of pesticides and other inputs, would impoverish small landholders and benefit larger ones, who would be able to amass even larger holdings at the expense of the unsuccessful. To some extent this has been circumvented by a great drive to improve rural banking and give small farmers access to credit. Cooperative irrigation schemes have increased the supply of water. Although many small farmers

did fail, the technology has been adopted by small and large alike. But progress in general education is needed too – an illiterate farmer cannot read the instructions on a packet of chemicals; neither can he understand the written conditions on a banking loan. Although slow, but real, advances have been made in these areas, anxieties must remain over the long-term ecological implications of imprecise chemical use.

Acting as a brake on the speed of progress is the overwhelming amount of rural poverty. While agricultural productivity remains low, rural incomes cannot rise. Many people in rural areas are therefore dependent on cash remittances from members of their family living in the cities. About half the rural population of India and Pakistan live below the poverty line (and it is a low one); in Bangladesh 90 percent do so.

### A mixed pattern of success

The increases in food output since the Green Revolution have been greater in some areas than in others. Particular crops have benefited more conspicuously than others, too. In India the production of protein-rich pulses such as gram has



## FARMERS' TRADITIONAL KNOWLEDGE

When modern scientific methods of farming fail to achieve the results that are expected of them, the peasant farmer is often blamed for lacking the necessary skills to put them into effect. Such a view overlooks the wealth of knowledge that all farmers, even illiterate ones, possess. Increasing efforts to study and understand traditional farming behavior is leading to a growing awareness that it may often be as soundly based as scientific research, if not superior to it.

Most agricultural research programs have been, and still are, carried out by scientists who specialize in one crop only, and devote their effort to improving just one part of that crop – for example, the grain head of a specific cereal. However, peasant farmers look for more than one benefit from a crop. The new short-stemmed rice varieties,

for example, produce less straw (used as cattle feed) than the traditional ones, and it does not keep as well: these are strong reasons for farmers preferring the older varieties.

Furthermore, many new crops are grown as monocultures, which have to be treated with specific insecticides and herbicides. However, traditional intercropping, in which two or more crops are grown simultaneously on the same plot, inhibits the spread of disease without the farmer needing to resort to chemicals. Different plants growing within a field or plot may form a small ecosystem that has many side benefits for the farmer. The ragged and irregular crops growing in mixed fields throughout the subcontinent may actually be doing much better than the scientist, who tends to prefer uniformity and order, supposes.

**Rice: the staple food** (left) Rice is grown all over the subcontinent wherever there is enough water to do so successfully. Here a farmer in the rainy coastal plain of Tamil Nadu in the south of the peninsula is preparing a field for planting in the time-honored way, using oxen for plowing.

**Irrigation technology** (below) Irrigation is one of the most ancient agricultural arts and has long been used in the region: many irrigation systems have hardly changed over the centuries. The increasing use of wells lowers the water table, so that diminishing water reserves become more difficult to exploit.



stagnated, causing the quality of many people's diet to decline. The Green Revolution rice varieties proved much better adapted to the hot, dry areas of Pakistan and northwest India, where wheat production also showed dramatic improvement, than to the traditional rice-growing areas in the wetter east. Within India, the states that have the greatest areas of poverty and need do not have the purchasing power to buy surpluses from the more fortunate states. Consequently there is considerable government intervention in grain trading between states.

Bangladesh has always traded jute in exchange for imported rice. As its population rises its position becomes increasingly precarious, but significantly it did manage to achieve self-sufficiency for the first time in 1989 during a very good year. Here, more than anywhere in the region, the benefits of the Green Revolution have been most thinly spread, and increases in rice yields have proved hard to achieve. Wheat, very little grown in the past, is becoming increasingly important as a second (winter) crop, following the monsoon rice. Even so, wheat – the most widely available traded grain – accounts for more than 7 percent of its imports, and vegetable oils a further 5.7 percent.

#### Greater cropping intensities

India and Pakistan now achieve food self-sufficiency in most years, and their food supply in the near future would seem assured. But if increases in yields should taper off, as rice yields in Pakistan are doing at present, and population growth does not slow down still more, the longterm situation is by no means secure. There is little remaining land to bring into cultivation. However, in many parts of the region some land is cropped more than once a year, and efforts are being made, by increasing the extent of irrigation schemes, to make the practice more widespread.

Irrigation can bring with it many problems, however. In many areas large canal schemes have proved very difficult to run efficiently, with water never reaching farms at the tail end, and supplying other farmers in unpredictable quantities at irregular times. Irrigation can also cause damage to the land through waterlogging and salinization: some 22 percent of land irrigated by Pakistan's canal system is now unusable because of salinity, and 13 percent in India.



# Growing jute for the world



Jute is the common name of two species of a tall, woody plant (*Corchorus capsularis* and *C. olitorius*). It is similar to a tall reed or rush that, when cultivated and cropped each year, reaches a height of between 3 and 4 m (10 and 12 ft). It grows throughout the subcontinent, but is best suited to the warm, moist conditions of Bengal in northeast India and Bangladesh.

Its bark produces an excellent fiber for sacking, rope making, and carpet and linoleum backing. It is separated from the woody jute stem by soaking (or retting) it in water in a pond or specially built tank for about twenty days. The fiber is then stripped by hand before being sold to a bulking merchant, who presses it into 180 kg (400 lb) bales for export.

The plant has other uses as well. The woody stem is suitable for making fences, for the base layer of roof thatch, and for a fuel to cook with. It also makes perfect charcoal for gunpowder, which gave it great value in the past. The fresh green leaves of one species can be eaten, and are somewhat similar to spinach.

Jute has always been part of the rural economy of the Indian subcontinent. It rose to commercial importance when India was under British rule in the mid 19th century; the jute grown in Bengal became the world's leading source of fiber for sacks, required for carrying the burgeoning international trade in grains,

**Preparing the fiber** The long thin stems of the jute plants are soaked in any available piece of water to soften the bark. This is then laboriously stripped away by hand.

cotton and wool. Most of it was shipped to Scotland, in northern Britain, for manufacture; the town of Dundee is still a center of the jute trade. Manufacturers there are in regular touch with the jute auction houses in Calcutta, where a manufacturing industry also grew up under the British.

## Trade rivals

The partition of Bengal in 1947 between India and East Pakistan (later to become Bangladesh) abruptly severed the relationship between Calcutta and the jute suppliers of East Bengal, and the situation was exacerbated by the subsequent trade war between India and Pakistan. Production increased in both countries; jute grown in East Pakistan was Pakistan's most important export in the years before the province gained its independence as Bangladesh in 1971. It also commanded 60 percent of the world jute market.

However, world demand has consistently declined in recent decades because of the growing use of synthetics in carpeting and the replacement of sacks by bulk containers in the international carriage of goods. However, jute and jute products still account for about 30 percent







**A jute mill in Bangladesh (above)** Bundles of jute fiber are prepared for spinning into coarse rope. A large proportion of the raw fiber is shipped to processing plants in Western Europe and Japan, where it is used to provide backing for carpets and linoleum flooring. The growing use of synthetics has seen a fall in demand, but jute still remains an important export.

**Exhausting work (left)** An umbrella has been tied to a jute stem to provide shelter from the sun for a farmer weeding his plot of young jute plants. Jute is an annual herbaceous plant, it requires humidity and an average monthly rainfall of 7.5–10 cm (3–4 in) to reach its full height of 3–4 m (10–12 ft), and is therefore ideally suited to the climatic conditions of West Bengal and Bangladesh.

of Bangladesh's total export revenue; this is matched in importance only by the finished garment industry. However, its share of the world market has fallen to less than 40 percent, and it has been overtaken by India and China.

Although jute cultivation remains very large in terms of the volume produced and the value of export revenue earned, it is not run by big businesses or carried out on extensive plantations. It still remains the main support of a very large number of small peasant producers, who cultivate it for cash on their smallholdings and ret the bark in the nearest pond. Its cultivation is in direct competition with rice for the farmer's land and labor. If improved Green Revolution varieties begin to increase rice profitability in east India and Bangladesh, jute growing will probably decline still further in both countries.



## The vegetable market

Vegetables are an extremely important element of people's diet throughout the Indian subcontinent: in India about half the population are vegetarian.

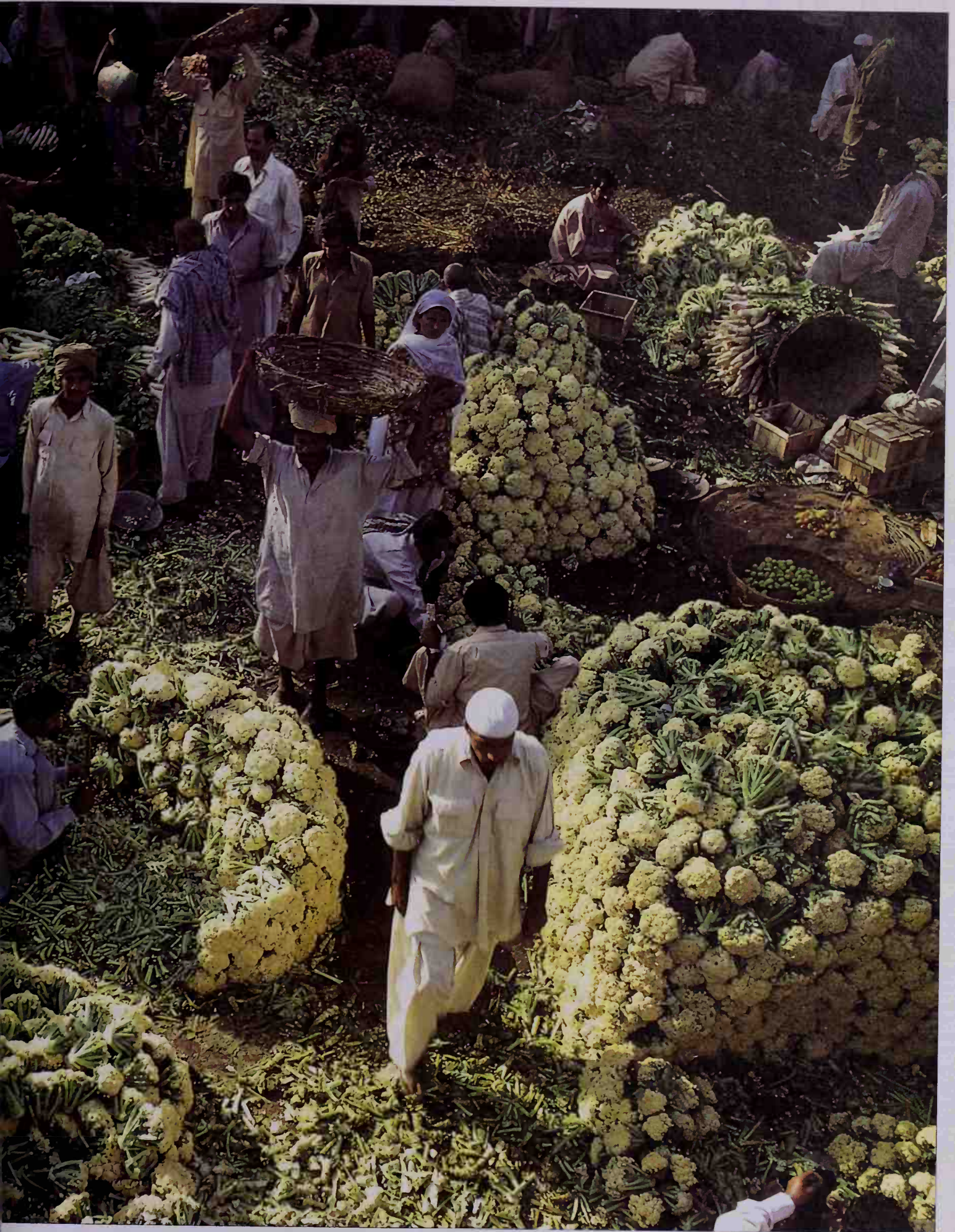
Most of the region's peasant farmers have only tiny surpluses of produce for sale at any one time. As a result the marketing network, though appearing unsophisticated, is quite complex and may involve several links. Typically, a farmer will deliver a small amount for sale to his local market. This is usually within walking distance of his farm, and he will often carry what he has for sale in a basket on his head.

Each local market will have specialized areas for produce within it, where local people can buy what they need for their own use. There will also be a large number of middlemen who visit the different producers, purchasing enough from each of them in turn to make up a truckload. This is then delivered to other wholesalers and retailers in nearby towns and cities. Each of India's and Pakistan's large cities is surrounded by a complex web of collection routes, which radiate out over wide areas of the countryside.



**Mountains of cauliflowers** in a section of a vegetable market in Rawalpindi, Pakistan.







# INDUSTRY

RAW ENERGY · GROWTH AND MODERNIZATION · EXPLOITING THE POPULATION

**F**ossil fuels, mineral ores, jute and a vast workforce are among the principal industrial resources of the Indian subcontinent, primarily an agricultural region trying to develop its industrial sector. Electricity and other kinds of energy to feed large-scale manufacturing plants are more limited. India itself has large reserves of coal that can be used to generate electricity, and is developing a number of oil and gas fields as well as nuclear power. Other countries in the region, especially Pakistan and Bangladesh, lack these advantages and a reliable national power supply is still a problem. The complicated social structure, famine and environmental disasters combine to work against rapid industrial development. The potential of the region is enormous but any resolution of its many difficulties is likely to be painfully slow.

## COUNTRIES IN THE REGION

Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

## INDUSTRIAL OUTPUT (US \$ billion)

Total	Mining	Manufacturing	Average annual change since 1960
86.33	7.53	68.0	+5%

## INDUSTRIAL WORKERS (millions)

(figures in brackets are percentages of total labor force)

Total	Mining	Manufacturing	Construction
43.2	2.4 (0.7%)	34.2 (10.2%)	6.6 (2.0%)

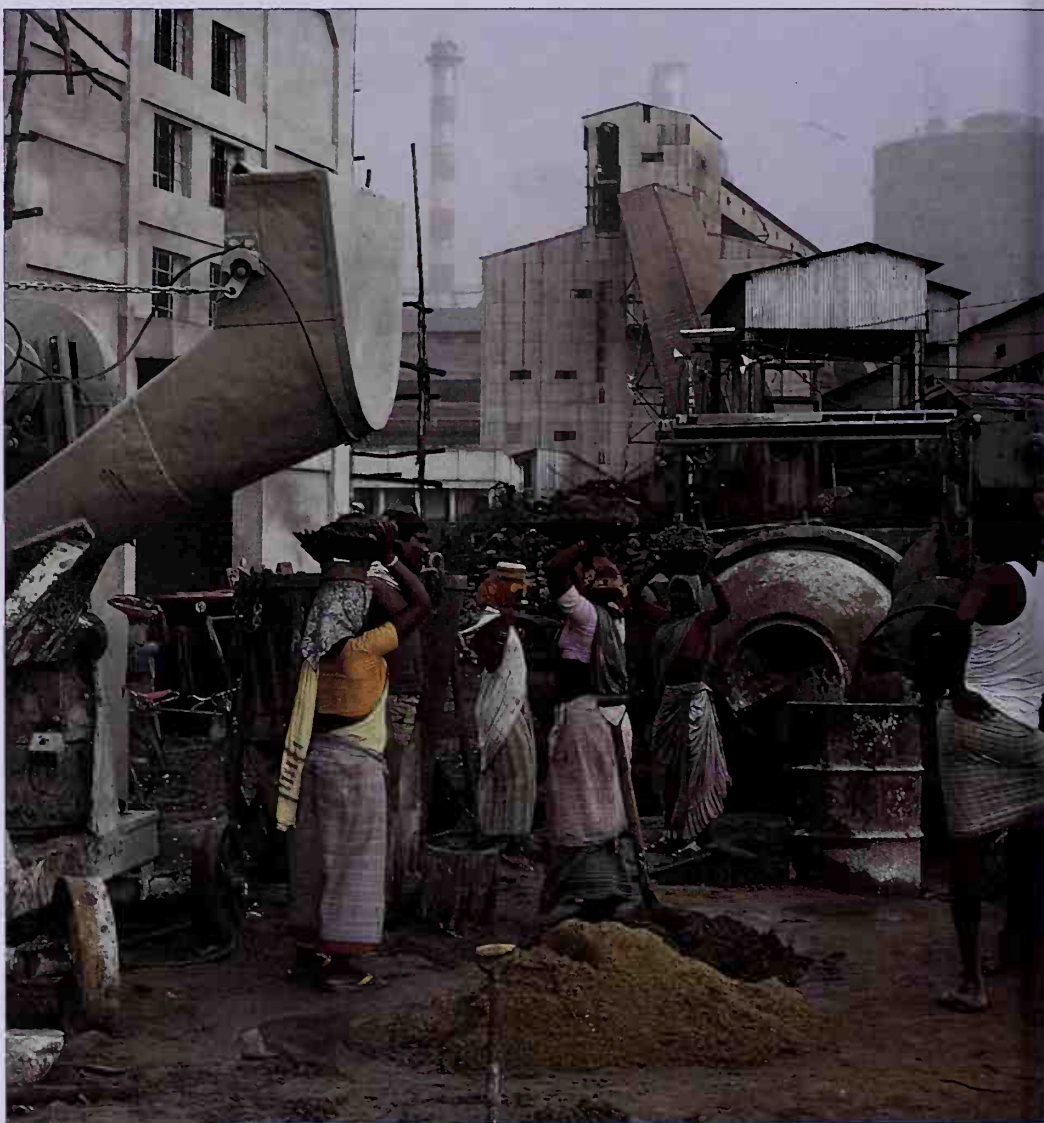
## MAJOR PRODUCTS (figures in brackets are percentages of world production)

Energy and minerals	Output	Change since 1960
Coal (mill tonnes)	205.3 (4.3%)	+271%
Oil (mill barrels)	266.8 (1.2%)	+7900%
Iron Ore (mill tonnes)	32.8 (5.8%)	+77%
Bauxite (mill tonnes)	4.0 (4.1%)	+255%

## Manufactures

Refined sugar (mill tonnes)	10.5 (16.4%)	+193%
Cotton woven fabrics (mill sq. meters)	16969 (14.2%)	+263%
Jute fabrics (mill sq. meters)	3735 (92%)	+48%
Footwear (mill pairs)	197.4 (4.4%)	+1368%
Broadleaved sawnwood (mill cu. meters)	15.1 (12.1%)	+647%
Nitrogenous fertilizer (mill tonnes)	7.9 (8.5%)	+652%
Cement (mill tonnes)	45.5 (4.1%)	+415%
Transistors (mill)	3560 (5.2%)	N/A
Bicycles (mill)	7.4 (7.3%)	+662%

N/A means production had not begun in 1960

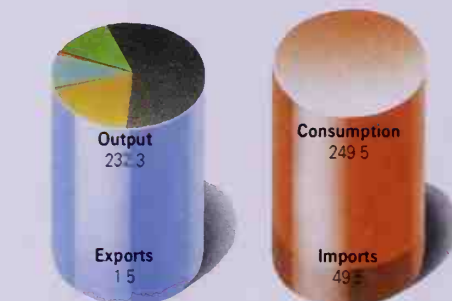


A long-established iron and steel plant (above) at Jamshedpur, in southern Bihar, which is one of the chief centers of India's metal industries. Women working as laborers are engaged in rebuilding one of the site's dilapidated structures.

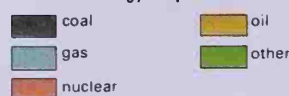
## RAW ENERGY

India has sizable amounts of natural resources including coal, iron and manganese ore. Coal supplies are vast. Reserves of lignite (brown coal) are sufficient to meet the country's needs, but those of bituminous coal, used to make iron, are too low to match iron-ore resources, so much of the ore is processed in other parts of the world. Coal reserves are not evenly distributed. They occur in West Bengal and Bihar in the northeast and in Madhya Pradesh and Andhra Pradesh in the center and southeast, and have to be transported hundreds of kilo-

## Energy balance (mill. tonnes coal equivalent)



## Sources of energy output



**Energy production and consumption (left)** Although expansion of the region's energy resources, including coal, natural gas (which has seen enormous growth in recent years) and hydroelectricity has been rapid, industry is dependent on petroleum imports





**Map of principal resources and industrial zones** The mineral resources of the Indian subcontinent are extensive, but patchily distributed. Coal, including lignite, and iron ore are the most widespread, but even so large areas lack significant deposits of any kind. The region has great potential for resource development. Many deposits are not fully exploited, and mineral surveys of some areas are still to be made.

meters. In Pakistan the best reserves are in Kalabagh, West Punjab. India has lignite deposits at Tamil Nadu in the southeast, where they are used to produce fertilizers, power and briquettes, and at Rajasthan and Gujarat in the northwest. Lignite is also found in Bangladesh.

Singhbhum and areas of Orissa state in northeast and east India contain some of the Earth's richest iron-ore deposits, making the region one of the world's largest exporters of iron ore. Small but concentrated deposits of high-grade iron ore also occur in Pakistan and in Sri Lanka, where it is used for electrosmelting.

Chromite and titanium are found as well in India but full exploitation of these resources has not yet been achieved. The country is short of other metals, but the Geological Survey of India has revealed deposits in several areas, none of which has yet been mined. Sulfur can be ex-

tracted from pyrites at Amjore, Bihar.

Natural gas is present in huge quantities in Pakistan, especially in the northeast at Siu between Baluchistan and Punjab. A network of gas pipelines links gasfields with the main consumption areas. Bangladesh has natural gas at Comilla and Sylhet, used primarily to produce fertilizers and thermal power.

Pakistan has 20 different types of minerals including chromite, celestite, bauxite and barite. However, many of its mineral resources are underexploited or low grade. It does have high-quality, easily extractable limestone deposits, including marble, which form the basis of an important cement and construction industry. Sri Lanka has a seemingly inexhaustible supply of graphite (its major export), used in nuclear reactors and for making pencils. The island is also rich in many kinds of gemstones.

Nepal, Bhutan and the Maldives are comparatively poor in natural resources. Nepal has coal, iron ore, copper and a handful of other minerals in small scattered sites. Very little has been done to exploit them. Bhutan has not been surveyed and there is little or no industry there. The same is true of the Maldives, one of the poorest countries in the world.

#### Postcolonial industrialization

Traditionally India has a strong manufacturing base in fine cotton and silk clothing, exporting it all over the world. Jewelry is also a long-established craft in the region, combining the finishing and mounting of local precious stones with metalworking skills. The development of modern industries in the region began on a modest scale before independence in 1947. New cotton mills were built in Bombay and Tamil Nadu, though only one steel plant, Jamshedpur in Bihar, was constructed despite the availability of coal and iron ore. India's industrial development since independence has followed a





**Goggles and turbans** Workers at a cement plant in Gujarat, northwestern India, protected against irritant dusts, resemble extras from a space movie. Not all workers are so lucky. In the rush to industrialize, safety measures may be disregarded.

West Bengal and Orissa. These are the areas that form the heart of the steel and heavy engineering industries since the deposits of coal, iron ore and other minerals used in processing and production are concentrated there.

The success of some agricultural projects in the region has enabled farmers and cooperatives to invest in smallscale engineering projects. In the Punjab, for example, mechanization on the farms and the development of irrigation techniques have generated considerable growth in medium-sized engineering industries. These changes have also given a boost to the transportation sector that moves the goods from one place to another.

#### Looking for expansion

The Pakistani government has also attempted to encourage industry, and to reduce the overwhelming reliance on agriculture that existed at independence. Shortages of electricity and fuel in Pakistan have hindered industrial development, and hydroelectric schemes have been developed on the Indus and Jhelum rivers in an attempt to meet demand. Agriculture now accounts for less than a quarter of national income, and the manufacturing sector has increased to contribute one-fifth.

During Pakistan's initial efforts to industrialize in the early 1950s, manufacturing expansion concentrated on processing agricultural products. However, industry in the area soon became dominated by cotton textile mills. These are still significant employers in the sector. Woolen textiles, sugar, paper and tobacco industries developed alongside. In the mid 1950s imports were reduced, so foreign companies began to establish branches within Pakistan to produce consumer goods and eventually items such as light engineering components, fertilizers and chemicals. In the last decades of the 20th century there was a move into steel products but, despite attempts to diversify, cotton textiles continue to be the major export.

Bangladesh is still dominated by agriculture, which causes a regular pattern of seasonal unemployment. Repeated natural disasters such as devastating

variety of routes. The government has created numerous public sector industries, including iron and steel plants, engineering enterprises, aerospace factories, and electrical and petrochemical concerns. Many dams have been built to provide hydroelectric power (HEP).

At the same time, however, the government has restricted many private plants to producing items considered to be socially useful, such as pharmaceuticals. The output of "luxuries" such as private cars was for many years strictly limited by quota, though after the 1980s there was a significant increase in the production of consumer goods, much of it due to the growth of largescale manufacturing. Private enterprise on a smaller scale also makes a significant contribution.

#### GROWTH AND MODERNIZATION

New industrial growth across the subcontinent has been generated by a mixture of internal expansion, foreign investment and the exploitation of new resources. Investment in the private sector, usually by large combines, has been a force for change in the petrochemicals industry and in the automobile trade. Public-sector investment has been concentrated in basic industries such as coal, iron, steel and heavy engineering, as well as the defense and aerospace industries. In India, central government funding has created a string of new cities in the northeastern and eastern states of Bihar,



**Celluloid success** (right) India ranks above the United States and Japan as the largest producer of movies in the world; more than 70 million people visit the cinema each year. Movies are made in all the major languages, and romance and social themes are the most popular. The movie industry is subject to government censorship.



**Turning wheels** (below) Making bicycle parts at a factory in Lahore, Pakistan. There has been considerable expansion in light engineering, but much of Pakistan's manufacturing machinery, such as the lathes and presses seen here, has to be imported, as do many of industry's raw materials.



floods have undermined much of the country's attempts to establish other enterprise. As a result, little heavy industry has developed, though the economic climate is able to sustain a wide range of cottage industries. The government has tried to tackle the country's endemic problems with an industrialization policy, but lack of mineral resources has restricted its success. Jute, cotton, hides and skins traditionally form the basis of processing industries; jute and tea are still major exports. Bamboo plants provide excellent raw materials for paper-making and there are four mills in the country. Bangladesh also has sugar factories, glass and aluminum works, a shipyard at Khulna in the south and a steel mill farther west at Chittagong.

#### Where the old meets the new

In many parts of the region traditional industries are still practiced. Bangla-

desh's cottage industries produce yarn, textile fabrics, carpets, ceramics and cane furniture. Modern largescale counterparts have grown alongside them, and sometimes a modern industry can grow from the roots of a traditional one. India has, for example, a number of shipyards that construct vessels both for defense and for the country's large merchant fleet. At the same time, scattered along the coastline, particularly on the coast of Gujarat in the northwest, a number of small yards still produce wooden cargo ships (dhows). These craft – manufactured almost entirely by hand from local timber – ply across the Arabian Ocean to the Gulf states and eastern Africa.

The region is, potentially, a huge market for consumer goods. In recent years there has been a growth in production of items such as refrigerators, televisions and air-conditioning units. Modern office equipment is also increasingly popular – photocopiers are built in India under license from, and with the cooperation of, Western or Japanese companies. The automobile industry has also changed drastically in the last decade – again with Japanese cooperation – and a number of relatively modern and lower cost vehicles were manufactured in India during the 1980s.

Many of the cars and motorcycles produced in the region are no longer even made in the country that developed them. The original tools and jigs have simply been transported to create a new production line in India. In Madras the Indian Enfield company still manufactures a motorcycle that originated in Britain in the early 1950s. In the 1980s the company began to export these machines back to Britain, another twist in the complex import-export relationship that has long linked the two nations.

Exporting machinery and equipment to the rest of the world is, relatively speaking, still in its infancy. India has a very wide-ranging manufacturing capacity – covering the spectrum from sewing-machines and bicycles to nuclear reactors and rockets. Much of what is produced, however, is of low quality and relatively costly in world terms, which makes it difficult for Indian goods to compete successfully in international markets. Some progress has been made in exporting railroad rolling stock and trucks, and the export of handmade cotton goods has also thrived in recent years.

### POWERING INDIAN INDUSTRY

A great obstacle to the development of manufacturing in the region is the lack of a reliable supply of power, even in the larger cities. Although many parts are rich in coal, using it to generate electricity has been a slow and difficult process. One of the problems is that the coal, especially in India, has a high ash content, making it a poor quality fuel. Another is that, in the days of the British empire, much of the coal mined in the region was exported back to Britain, and India has made full use of its own resources for only a relatively short period.

Since independence, boosting coal production in India and investing in

new power stations to supply the demand for electricity has been a priority for every administration. Now coal-fired thermal power stations provide two-thirds of the country's electricity, and can meet the needs of a rapidly expanding iron and steel industry. India's urban population has more than quadrupled since independence, and this expansion has led to a vast increase in the need for electric power. The demand is not only to feed domestic services – lighting and water pumps – but also for new factories making the electrical and consumer goods that are becoming an everyday part of life for the burgeoning middle classes.



## EXPLOITING THE POPULATION

The vast population of the region could be a major industrial resource both as a workforce and as a market. However, a number of economic and social considerations have prevented the situation developing the way it has in Europe and the United States. At independence the Indian government believed that the lack of industrialization was partly due to the reluctance of Indian entrepreneurs to invest. Other, perhaps more significant, factors were that the British had given no encouragement to local industry, which eventually would have come into competition with their own exporting industries. They also neglected to develop a higher education system that would, in the future, meet the needs of a new technological society.

The local culture, too, and the values instilled by religion, played a part in the way the workforce reacted to possible change. India's bureaucracy before independence was dominated by Hindus, notably of the educated higher castes. When the region was partitioned in 1947, the new Muslim state of Pakistan found itself with a severe shortage of educated clerical workers and government officials.

### Religious divisions and social barriers

Within mainstream Hindu India, the persistent legacy of the caste structure is another reason for the lack of an entrepreneurial industrial class. One group of castes – called collectively the Vaisya – have traditionally controlled the business sector, by which is meant trade and moneylending, or banking, rather than investment in production. It is significant that one of India's most famous business houses, which embraces a wide range of industries from trucks to hotels, is dominated by the Tatas, a family from the Parsi community of Bombay. The Sikhs too are noted for their industrial dynamism. Their energy has turned the Punjab into one of the most affluent states in India, with highly developed agriculture and manufacturing plants. In the Hindu community caste barriers can still cause resistance to certain kinds of "demeaning" jobs.

A shortage of management skills is also partly responsible for the inefficiencies of government enterprises. The region possesses very few management training



**A ship dismantled** A giant boiler lies in pieces in a shipbreaker's yard in Chittagong, Bangladesh, as a worker tackles the task of dismantling its boiler rods for scrap. Throughout the region, nothing is too large or too small for industrial reuse.

schools, and those that do exist tend to be exclusive – the preserve of those who can afford the high fees. There is no shortage of educated manpower at some levels – India has an excess of trained engineers of every type – but career aspirations are often limited to obtaining a safe, salaried, permanent job in a large corporation or in government service. Such jobs are seen as a sure way to avoid sliding into the widespread poverty that afflicts so many people in the country, but it is not an attitude that encourages individual initiative and enterprise.

### Organized labor

The Indian government distinguishes between the "organized" and the "informal" sector. The informal sector consists of factories with less than 12 employees, or less than 50 if electric power is not used. Large numbers of people work in the informal sector, either making completed products or manufacturing parts for larger firms. Industries in the two sectors often rely on each other: small-scale dyers, for instance, may use factory-produced cloth and then sell it on to established retail firms. Within the organized sector, legislation ensures some employment protection, and there are limited regulations regarding health and safety at work. Many workers in smaller concerns do not even have these benefits





### WHERE NOTHING GOES TO WASTE

One characteristic feature of industry in the subcontinent is the vast number of smallscale enterprises, many of which are involved in reconditioning or recycling goods. Oil drums, for example, can be beaten out flat and used to make steel trunks. Sometimes this is done by leaving them on the road for passing trucks to run over. In the West a burnt-out electric motor is often simply thrown away, but in India small electrical workshops rewind armatures and reconstruct bearings – cheap labor makes it cost effective.

Workshops will typically mix technologies and techniques; the very old with the very new, the very cheap with the more expensive. Ropemakers use wooden spindles to weave nylon fibers bought from a mill into modern synthetic rope. Quartz clock movements are installed in handmade wooden cases, and weaving techniques, once employed to make raffia furniture, are now used with plastic threads on steel-framed chairs.

**Working for eight rupees a day** Child labor is a fact of life in a region where poverty is widespread, labor is cheap, and children are regarded as potential wage earners from an early age. This 10-year-old boy is employed at a carpet loom in Pakistan – a craft in which children traditionally work beside their fathers.

areas. It is therefore very difficult to organize labor, and unions are restricted almost entirely to the organized sector. In some cities rickshaw drivers have formed unions, but attempts to organize the poor in this way are liable to bring a violent backlash from employers. In both Pakistan and India unions in larger private or public-sector concerns are quite well established, and have been involved in political struggles. A strike by Indian railroad workers in the 1970s and disputes in the Pakistani cotton trade were typical incidents that have slowed development.

Gradually the region, particularly India, has seen the development of a new urban middle-class with buying power. Often they are professionals and skilled workers employed in a government scheme. Bangalore in southern India has benefited from central government investment in hi-tech aerospace and electronics industries and an expansion of state government employment. These have combined to give the city the fastest-growing economy in India, making it the "Silicon Valley" of the region. At the other end of the scale, many people, including children, work in poorly paid jobs in factories making items such as local hand-rolled cigarettes (bidis). In northern India and Pakistan children are commonly found in sweated workshops producing rugs and carpets.

– it is simply beyond the scope of any administration to monitor the huge variety of small enterprises. In any event, many operate on such small profit margins that they cannot bear the cost of additional overheads.

Another aspect of uncontrolled activity in the informal sector is the impossibility of imposing environmental controls. Waste substances – often highly toxic – are simply dumped as quickly and cheaply as possible. In the competitive world of the small business the expense of ensuring proper disposal would seriously undermine profitability.

Many workers in the informal sector are short-term migrants to the cities, working there to earn a cash income to supplement the meager living that prevails in rural





# Sackcloth to silks



**A cottage industry (left)** Throughout the region, but especially in Bangladesh, where textiles are a vital constituent of the country's economy, most textile factories are small, family-owned workshops that employ only a handful of people. In this factory in Dhaka meters of yellow cotton fabric are being made up into garments to be sold locally

**Fashion articles for the West (right)** In the garment export-processing zone of Chittagong, in southeastern Bangladesh, denim jeans are laid out in the sun to fade into the light hues demanded by fashion-conscious Western consumers. Finished garments now constitute the single most important element in Bangladesh's exports

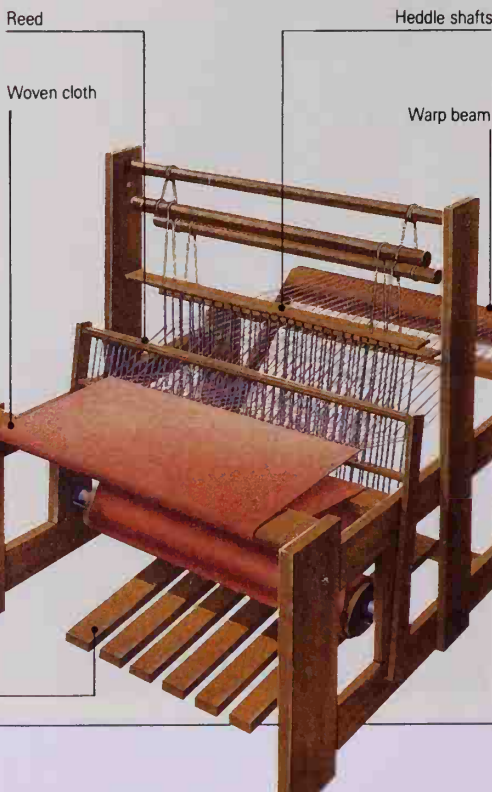
The region's textile industry uses a wide range of technologies, from smallscale local production to large modern mills. In Bengal before partition the dominant textile industry was the production of jute to make sacking. Bangladesh has managed to rebuild its textile industry, which was curtailed when, as East Pakistan, it was severed from India. Jute processing now contributes significantly to the economy.

Locally produced cotton for home use – a form of subsistence industry – is still found in some rural areas. Cotton is collected from the seeds of certain plants in the genus *Gossypium* and then spun into thread using a simple weighted bob or a spinning wheel. The thread can then be woven into cloth. Although the fabric would traditionally have been colored with vegetable dyes, these are seldom used today. Even the smallest production units are likely to use synthetic dyes produced by the chemical industry. The Indian government has encouraged the

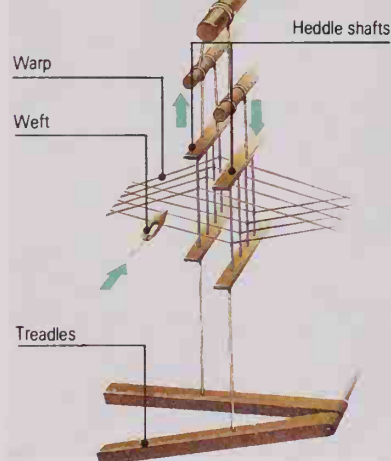
local production of handloom cloth, and restrictions on the output of modern mills through quotas have helped to sustain this cottage industry.

Silk – spun from the protective cocoon of silkworms – is a more specialized process and thrives mostly in southern India, near Bangalore in Karnataka and the towns of western Tamil Nadu. The quality can be extremely high, and a silk with fine gold filigree weaving is a prized possession. Almost all of these garments are sold in the domestic market, though India exports silk for clothing, furnishings and upholstery.

Weaving loom

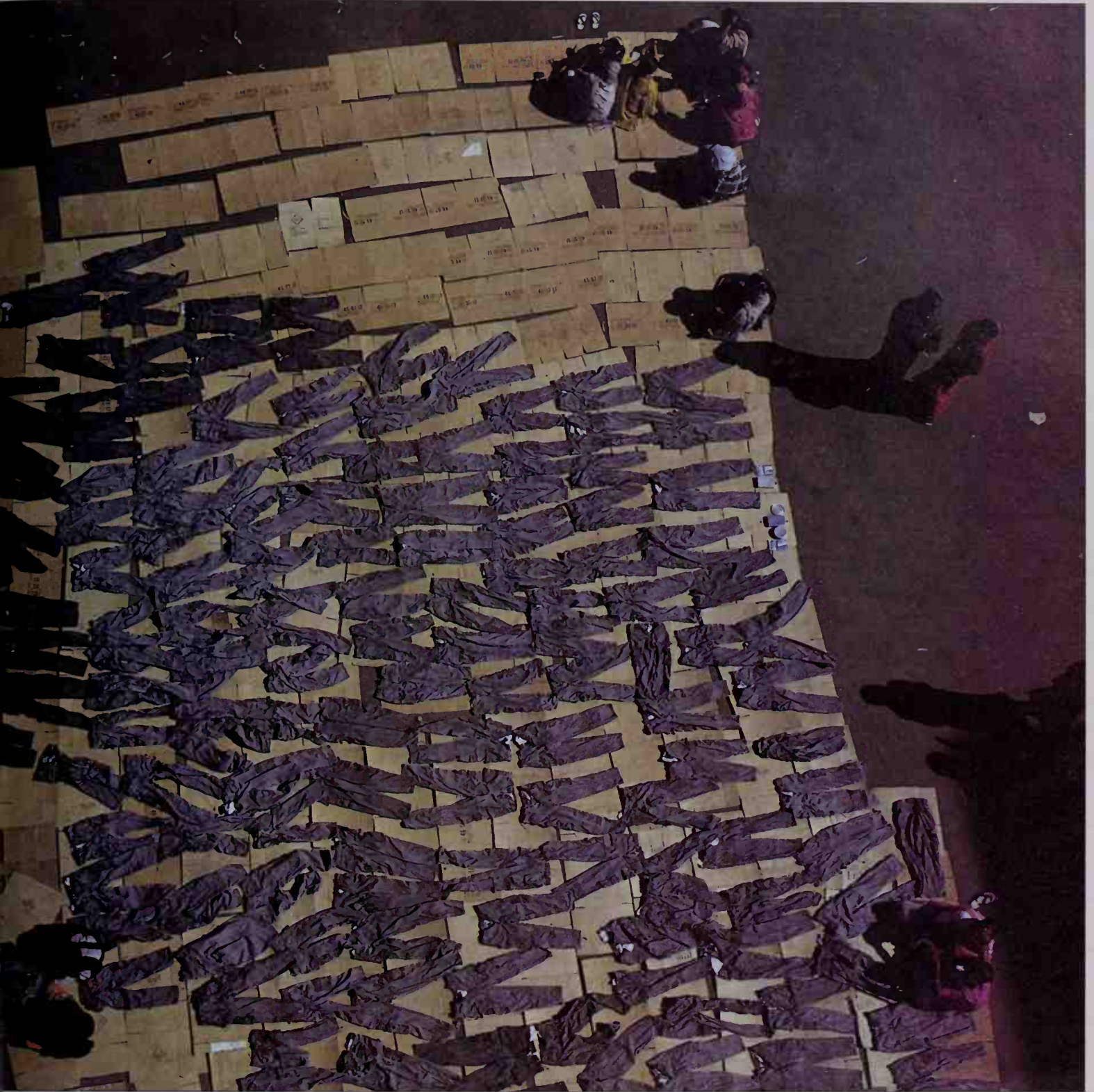


The loom mechanism



**Traditional technology** Handlooms are still used for weaving cotton and woolen thread throughout the subcontinent, though many factories are now fully mechanized. All looms work on much the same principles. The warp yarn is strung longways. The heddle shafts raise and lower the warp threads to create a "shed," through which the weft (the horizontal thread) passes in the shuttle. The reed moves back to place. On mechanized looms a motor replaces the treadle





### Modernizing the industry

Modern textile factories are located throughout India, but are concentrated around the cities of Bombay and Ahmadabad in the northwest and in the inland towns of Tamil Nadu.

In the 1960s modern synthetic fabrics became highly fashionable and caused a minor revolution in the textile industry. Supply depended on licensing from Western companies and relied on the petrochemical industry for raw materials

— factors that made nylon and terylene expensive compared with cotton, hence something of a status symbol. In the 1980s and 1990s, however, people rediscovered the comfort of natural fibers, and synthetics are now more likely to be used sparingly in blends as reinforcing agents.

The production of finished garments is an important industry throughout the subcontinent. Although in urban areas there is a trend toward selling off-the-peg clothing, the vast majority of people wear

clothes that need no tailoring — a lungi or dhoti for a man, or a sari for a woman, is simply a length of cloth wound in a particular way. Many people buy cloth and take it to one of the thousands of tailors that work in towns and cities throughout the region. New clothes can be made quickly and efficiently by these men, and as labor is cheap the cost is low. The people who produce finished clothing for export work to the standards laid down by the overseas importers.



# ECONOMY

FROM COLONIZATION TO INDUSTRIALIZATION · LAYING THE FOUNDATIONS OF A MODERN ECONOMY  
INEQUALITY AND UNEVEN DEVELOPMENT

The Indian subcontinent has an extremely diverse economy, though most of the region is very poor. Government welfare programs have improved life expectancy, literacy and general healthcare in many areas, but the number of people living in absolute poverty continues to rise. Since India, Pakistan and Sri Lanka won their independence in 1947–48, industrial development has brought about great economic changes, though in the poorest areas the economy still depends on agriculture. India now manufactures most of its capital goods (equipment used to make consumer goods) and both Pakistan and Sri Lanka are attempting to achieve the same. However, a combination of trade deficits, repayment of interest on debts and internal political conflicts continues to strain economic development.

## COUNTRIES IN THE REGION

Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

## ECONOMIC INDICATORS: 1990

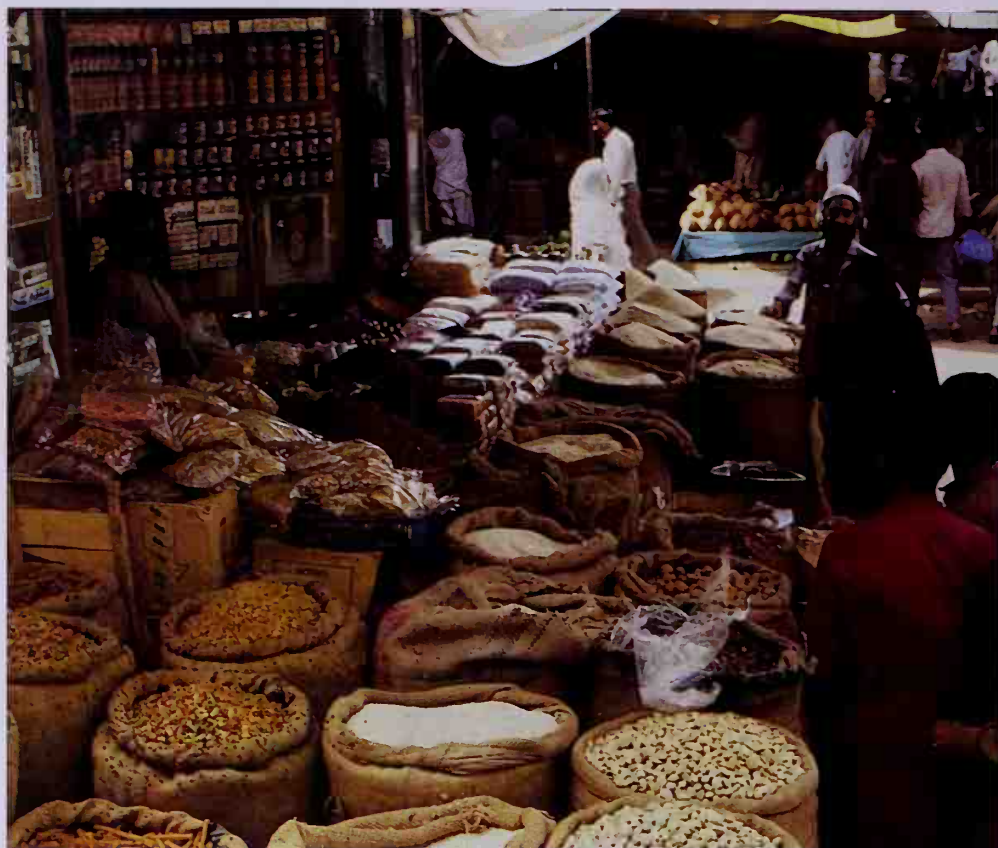
	LIE* B'desh	LIE* India	LIE* Pakistan
GDP (US\$ billions)	22 88	254.54	35.5
GNP per capita (US\$)	210	350	380
Annual rate of growth of GDP, 1980–1990 (%)	4.3	5.3	6.3
Manufacturing as % of GDP	9	19	17
Central government spending as % of GNP	15	18	24
Merchandise exports (US\$ billions)	1.49	16.1	4.95
Merchandise imports (US\$ billions)	3.38	20.5	6.94
% of GNP received as development aid	9.2	0.6	2.9
Total external debt as a % of GNP	53.8	25.0	52.1

## WELFARE INDICATORS

Infant mortality rate (per 1,000 live births)			
1965	144	150	149
1990	105	92	103
Daily food supply available (calories per capita, 1989)			
	2,021	2,229	2,219
Population per physician (1984)	6,390	2,520	2,900
Teacher–pupil ratio (primary school, 1989)	1 : 60	1 : 61	1 : 41

Note: The Gross Domestic Product (GDP) is the total value of all goods and services domestically produced. The Gross National Product (GNP) is the GDP plus net income from abroad.

\* LIE (Low Income Economy) – GNP per capita below \$610 in 1990.



## FROM COLONIZATION TO INDUSTRIALIZATION

The economic history of the Indian subcontinent has been deeply influenced by the area's long tradition of international trading and by the external influence of Mediterranean and Middle Eastern civilizations. From the 16th century onward, resource-based economies in many areas were exploited and expanded for trading purposes by European (and particularly British) colonizing forces. The export of opium (traded for Chinese tea) and the exchange of agricultural products for manufactured goods formed the basis of this trade. It continued well after India and Ceylon (now Sri Lanka) became independent in 1947 and 1948 respectively.

During the colonial period the local economy suffered greatly at the hands of the colonizing forces. Natural resources and trading profits alike left the region, and the local population was subject to land revenues and military taxes. However, some of the infrastructure left behind gave a boost to local enterprise after independence. For example, the British built an extensive transport and communication network and established

**Ancient wealth of the East** (above) Sacks of spices on a market stall in Karachi, Pakistan. Once an exotic and valuable commodity, spices were the basis of ancient trade in the region, eventually attracting the interest of the British and Dutch East India Companies and firing colonial ambitions.

a number of largescale industrial plants making iron and steel and textiles for domestic use as well as for export. Using these facilities, half of independent India's exports were of manufactured goods rather than raw materials by the end of 1947. The biggest obstacles facing industrial development were the lack of chemicals and heavy engineering industries, the low level of employment in factory industries and a heavy reliance on manufactured goods from Britain. Poor health and literacy among the workforce and the lack of financial systems to raise funding were also major problems. Agriculture was an unstable platform to support economic growth due to its susceptibility to unreliable rainfall, including drought, and to fluctuating markets.

### Promoting an independent economy

During the 1950s the new governments of India, Pakistan and Sri Lanka aimed to bring about economic development to relieve poverty and make their countries





**Profile of inflation** (above) India's inflation was sharply reduced in the mid 1980s, but rose slightly in the early 1990s following economic liberalization. In Sri Lanka, the effects of a destructive civil war followed closely by the world recession, sent inflation soaring; it is now by far the region's highest.

more self-sufficient. In India, the first prime minister Jawaharlal Nehru (1889–1964) advocated Soviet-style centralized economic planning, though he maintained a nonaligned political position. State-owned industries, such as iron and

steel, heavy engineering and chemicals, were developed to limit dependence on foreign goods, reduce the longterm balance of payments deficit, and increase national economic autonomy. Nehru also advocated strong control over private industry, discouraged foreign investment, and introduced land reforms to develop agriculture.

Pakistan and Sri Lanka, by comparison, had fewer industrial resources. The area that became East Pakistan (later Bangladesh) was dependent on jute growing and processing, but had few jute factories of its own. Partition dealt a severe blow to the industry since East Pakistan could no longer process its raw jute in Calcutta (over the new border in India). Both Sri Lanka and Pakistan exported agricultural products in exchange for imports of industrial machinery and manufactured goods. Later, supported by foreign aid, Pakistan began to manufacture goods that it had previously imported, particularly machine tools and chemical products. Sri

Lanka's revenue continued to rely mainly on primary exports (notably tea) until foreign exchange problems forced it to restrict imports and to develop private-sector consumer industries.

After 1965, economic growth slowed throughout the region due to a number of factors including falling rates of investment, India's conflict with Pakistan, drought and rapid population increases. Poor harvests between 1971 and 1974 combined with a global increase in oil prices to deepen the recession. They also heightened the need for aid and food imports. In the mid 1970s the "green revolution" in agricultural technology brought increased crop yields, particularly in Pakistan and northwest India. Bangladesh, however, did not benefit to the same extent, neither did it recover economically from its secession from Pakistan in 1971. A combination of war-related disruption, intense poverty, susceptibility to natural hazards and severe population pressure has forced Bangladesh to remain a predominantly agricultural economy dependent on large influxes of foreign aid.

The economies of Nepal, Bhutan and the Maldives were never directly governed by Britain and remained quite isolated from developments in the rest of the region. In Nepal, manufacturing industry has been slow to develop due to competition from Indian goods, but tourism has proved to be a good source of foreign revenue. Since 1958 Bhutan has relied almost entirely on India for its economic development, achieved by improving Bhutan's basic infrastructure, services, agricultural sector and processing industries. The Maldives, one of the poorest countries in the world, has a subsistence economy based on fishing and a small amount of tourism.



## LAYING THE FOUNDATIONS OF A MODERN ECONOMY

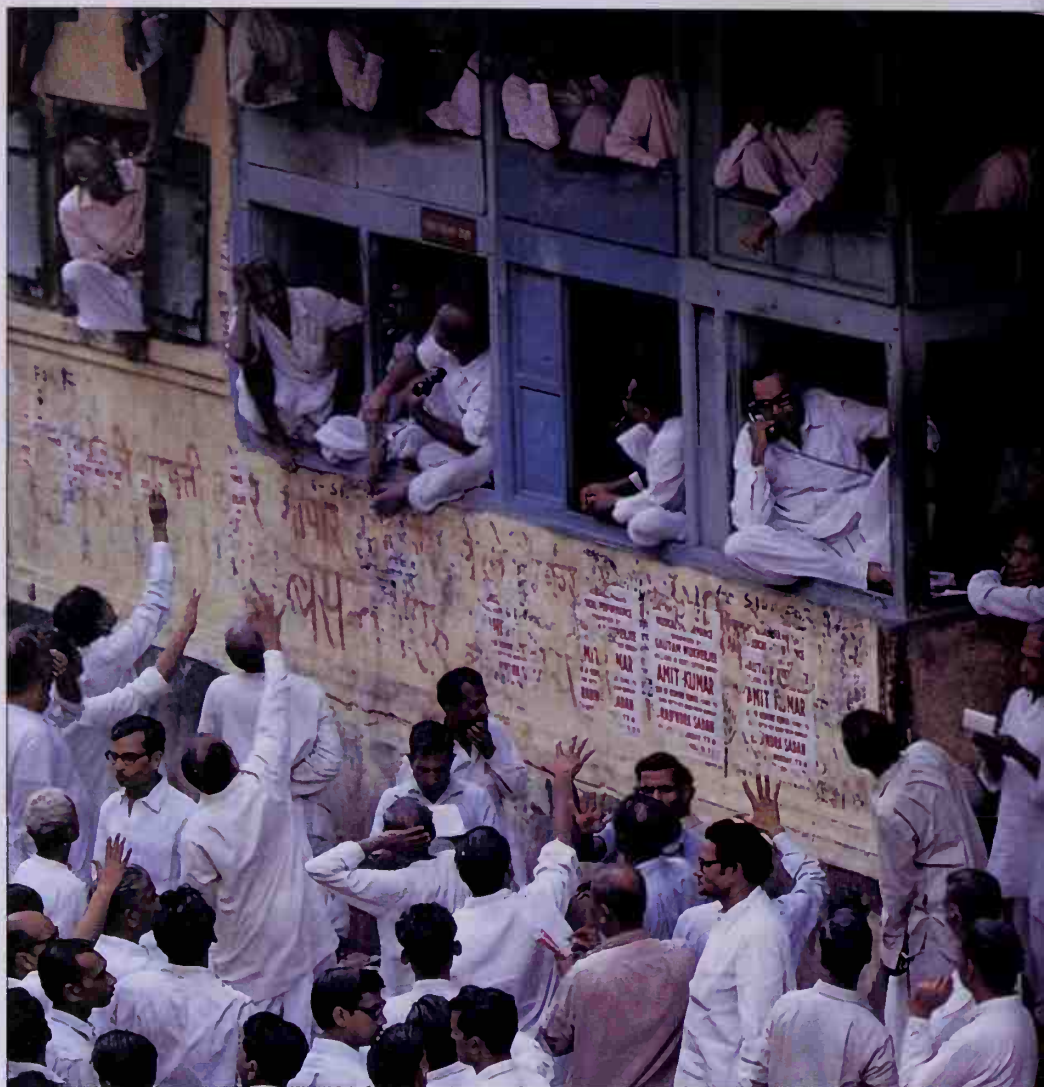
Strategies for growth across the region achieved mixed success in the 1980s and early 1990s. India benefits from a large and varied resource base and manufactures the majority of its own consumer goods, though demand exceeds supply. Manufacturing growth rates have been quite high since the early 1980s, and heavy industries now account for almost half of India's gross domestic output. Nevertheless, several of these industries are inefficient by international standards. Agriculture has kept pace with population growth and in the early 1990s India was a net exporter of cereals.

Pakistan has seen an increase in both economic growth and real wages since 1977. However, lack of investment in transportation, communications and basic infrastructure has tended to discourage private-sector enterprise. Agriculture has continued to grow steadily with record harvests in the early 1980s, but this has caused problems in other areas. The high levels of mechanization needed to sustain this pattern of growth have caused unemployment, encouraging some segments of the population to seek job opportunities in the Middle East.

Sri Lanka also increased its food production during this period. In the early 1980s the government specifically promoted increased agricultural output, and Sri Lanka became self-sufficient in rice in 1985. However, the export of food products has suffered from a decline in non-oil commodity prices in the 1980s and increased protectionism in some Western countries. A variety of successful domestic manufacturing industries, including ceramics, textiles and rolled steel, have helped to compensate for this loss, but tourism – an important source of revenue – has been disrupted by the civil war in the late 1980s and early 1990s. Bangladesh has grown less well and continues to rely upon agriculture for most of its gross domestic product (GDP). In 1990 modern factory industries accounted for only 5 percent of GDP and the Bangladeshi economy continues to remain heavily dependent upon foreign aid.

### Trade and aid

The direction of the subcontinent's trade has changed markedly in recent years

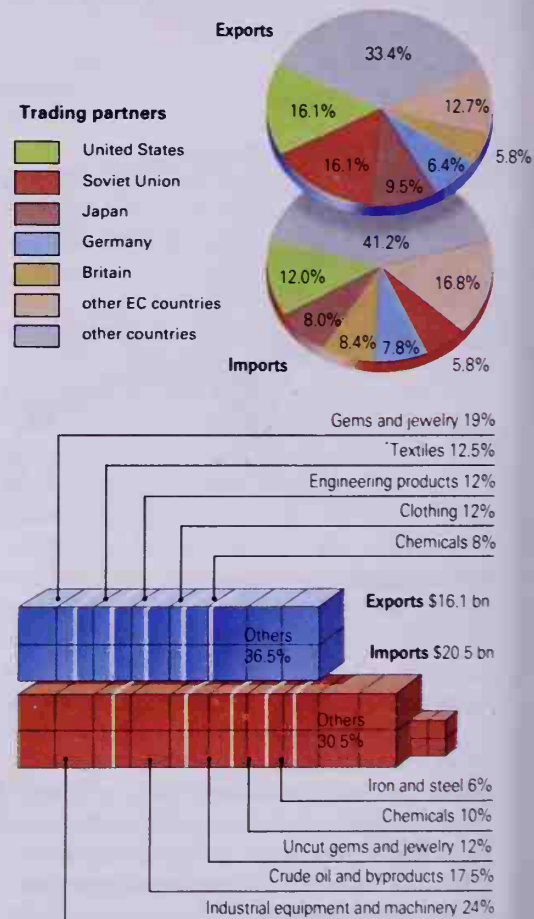


**Illegal kerb trading** (above) is carried on outside Calcutta's stock exchange. Just inside the building traders perch in tiny booths equipped with telephones to link them with brokers elsewhere. Financial trading in India is not yet computerized.

**India's balance of merchandise trade** (right) Like the rest of the region, India imports more than it exports; but is self-sufficient in food. Gems and jewelry remain important exports, but trade is no longer dominated by Britain or the former Soviet Union. Partners now include the United States, Japan and Germany.

since Britain lost its position as south Asia's major trading partner. Trading with the Organization for Economic Cooperation and Development (OECD) countries increased significantly during the 1980s. While an overall trade deficit has become an increasing threat to the region's economic growth, India managed to sustain a trade surplus in the 1980s with the former Soviet Union, and domestic oil production has enabled it to reduce oil imports from the Middle East.

The main exports of Sri Lanka and Bangladesh continue to be dominated by cash crops (rubber, tea, coconuts and jute), which have suffered greatly from a global decline in market prices. Imports of petroleum products, chemicals, machinery and manufactured goods have







**Hollywood in Bangalore** (above) The movie industry is big business in India, employing over 2 million people. Many films are exported to China, where their romantic plots and musical accompaniment make them popular. At home, the government taxes profits at 60 percent.

placed severe strain on the balance of payments in both countries, leading to increased levels of foreign aid, borrowing and interest payments. Sri Lanka responded to this problem mainly by lifting restrictions on international trade. Bangladesh, however, suffering from severe difficulties in exploiting its jute crop and hampered by its lack of economic infrastructure, has been forced into even greater levels of dependence upon foreign

aid. In Pakistan, high levels of government spending on arms has combined with other economic problems to squeeze the national budget. As a result, it has had to resort to World Bank funds.

In the mid 1980s, the Indian government introduced a new wave of funding for projects to develop industry and the infrastructure that supports it. Rajiv Gandhi's 1985 budget cut import duties on machinery and materials used to construct buildings, roads and manufacturing plant in order to make it easier to import foreign equipment for industrial expansion. It also reduced licensing restrictions (imposed in the late 1940s and early 1950s to protect and regulate new industries) and introduced tax incentives

for exporters. The level of borrowing needed to sustain the policies introduced by the budget resulted in constraints on the funding available for health, education and rural development. These constraints, and a related shift by some Indian companies toward the manufacture of luxury goods rather than mass produced commodities for the less wealthy, has meant that the vast majority of the Indian population has not benefited from this development strategy.

#### The role of agriculture

There is still much inequality in the spread of individual wealth across the subcontinent, caused not only by early colonial intervention, but also by recent economic developments. One example of this has been the appropriation of "green revolution" agricultural technologies by rural elites who are able to use their class or caste connections to obtain the latest supplies and information. In Pakistan, many large farmers who used to rent out land have taken it back for tractor cultivation, making many tenant farmers both landless and unemployed. In Bangladesh, too, higher caste groups have taken over cooperatives to ensure their access to agricultural supplies. Some used the resulting profits for moneylending and black marketeering. Both these factors have contributed to the fact that 75 percent of Bangladesh's population is now effectively landless. Even longterm economic development is influenced by the interests of various urban, industrial and rural elite sections upon whom governments depend for electoral support. The more needy, meanwhile, struggle to make their voices heard.

#### THE PRICE OF A CUP OF TEA

Sri Lanka is the world's largest tea exporter. Its export economy has been dominated by this crop since it replaced the island's blight-damaged coffee plantations in the 1870s. To ensure that sufficient people were available for year-round picking, pruning and processing the British gradually imported cheap Tamil labor from South India throughout the late 19th and early 20th centuries. Despite the recent Sinhalese-Tamil tensions in Sri Lanka, gangs of resident Tamil women still carry out most of the tea picking whereas men prune and plant. Labor costs which may amount to 60 percent of cultivation costs and 40 percent of total expen-

diture are minimized since wages tend to be low and living conditions poor.

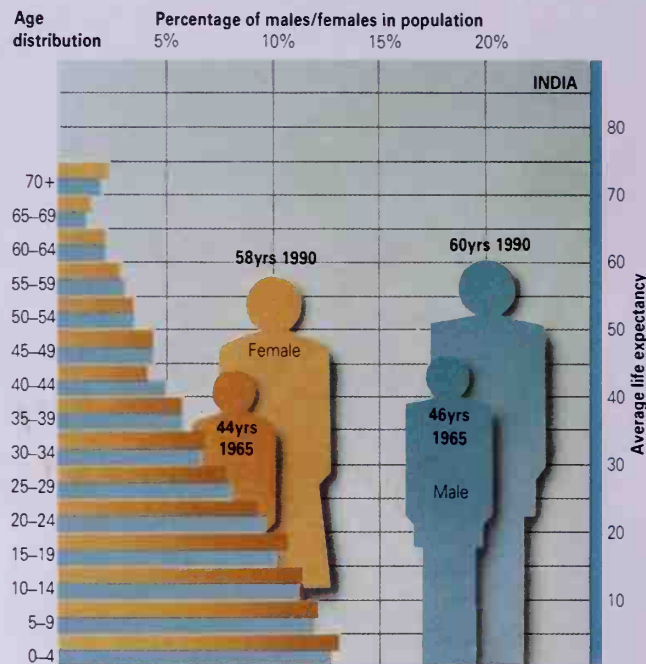
Export earnings from tea are subject to damaging price fluctuations on the international market. Only 9 percent of the tea grown is consumed domestically and when international prices slump, as in 1984-85, over two million people dependent upon the industry are affected. Britain was the main export target until the 1960s, but today, Pakistan, Iraq, Egypt and the United States are all major buyers. A quarter of Sri Lanka's tea is exported in bag or packet form and international brokers such as Lipton and Brooke Bond handle the largest tonnages.



## INEQUALITY AND UNEVEN DEVELOPMENT

Despite the fact that the number of people in absolute poverty is increasing in the Indian subcontinent, significant improvements in healthcare and life expectancy have been achieved in most areas. Some of the most notable advances have occurred in Sri Lanka where a high level of state expenditure has gone into the provision of basic healthcare, education and welfare. Schemes include government-subsidized rice for the population, guaranteed price schemes for food producers and land colonization programs for the landless. As a result, Sri Lanka sustains a relatively high quality of life compared with the rest of the Indian subcontinent, and life expectancy at birth there has risen from 43 years in 1946 to 71 years in 1990.

Elsewhere, life expectancy at birth has also increased significantly. In India, for example, it rose from 27 years at independence to 59 years in 1990. General standards of health have also improved since independence. Partly this is because food production is more reliable than it was in the middle of the 20th century and the incidence of famine has decreased. However, high levels of poverty mean that average food intake is still low in many areas, despite government



**Life expectancy and age distribution** (left) Life expectancy in India is average for the subcontinent but strikingly low compared with developed countries, in spite of recent advances in healthcare. Unlike most other countries in the world, in India men are likely to live longer than women. Life expectancy in Sri Lanka, by contrast, is almost as high as in developed countries, with women outliving men. Throughout the subcontinent, the large number of people under the age of 25 reflects the high birthrate.

**The economics of relief** (right) Food is distributed to people in a relief camp in Dhaka, Bangladesh, following a major flood. Poverty is the result of the lack of economic development exacerbated by a large population and frequent natural disasters. By the 1990s Bangladesh was the world's second largest aid recipient, receiving more than US\$2 billion annually.

welfare measures such as the establishment of subsidized "fair price" shops.

Government welfare policy also emphasizes the importance of free basic community healthcare, improved doctor to patient ratios and better medical facilities in rural areas. Even so, access to healthcare remains extremely unequal. It is biased strongly toward urban areas and care for wealthy elites. Many of the rural poor are unable to afford the traveling expense or time away from work to attend

distant clinics. Country health centers are frequently understaffed and poorly equipped. As a result, mortality rates remain high, especially among young babies. In India alone, it is estimated that around 5 million children die each year from preventable causes.

### Challenging social divisions

The benefits that come with secure employment are also unequally distributed throughout the population. India's Scheduled (lower) castes and tribal groups tend to remain at the bottom end of the economic hierarchy. To improve their situation, the Indian government has implemented a "positive discrimination" policy so that a proportion of jobs in the public sector are reserved for them. Dissatisfaction with the extent of these policies has led a number of disadvantaged groups to agitate for better terms. Meanwhile, higher castes resent the relative rise in status of the Scheduled castes who, traditionally perform ritually polluting tasks. The pressure of ill-feeling has vented itself in a violent backlash of prejudice and resentment against the lower castes.

Although formal education has a relatively well-established history in India, Bangladesh, Pakistan and Sri Lanka, the



**Filling the public sector** (left) Information and practice papers for the Indian civil service exams are available at a stall where vacancies are posted informally. In 1990, 18.7 million Indians worked in the public sector, half of them in the civil service.





#### BANGLADESH LIVING ON FOREIGN AID

Bangladesh (formerly East Pakistan) achieved independence in 1971 after a damaging civil war. The new state was left with little capacity to generate its own economic growth, since most of the major sources of investment were concentrated in former West Pakistan, from which it had just separated. Foreign aid provided the initial funds for repairing the country's damaged infrastructure and for rehabilitating the 10 million refugees who had fled to India during the war. As time went on, rapid population growth, food shortages and the inability of the economy to create significant revenue of its own produced a cumulative reliance upon international aid.

By the early 1990s, Bangladesh's domestic policies had become dominated by aid, and a number of elite groups had taken the opportunity to divert incoming funds away from the needy and into their own pockets. Many aid-related projects have come to be tied to the interests of these groups, but few are willing to invest the profits back into local industry. Instead, the state has become the main source of capitalist growth in Bangladesh, but its own funds are largely dependent upon foreign loans.

Bangladesh's expenditure on development, imports and investments depends largely upon financial aid while food aid provides the basic staple diet for six major urban centers. Even the steel, chemical and textile industries, potential sources for economic growth depend on raw material imports bought with aid, highlighting the near impossibility of Bangladesh achieving self-sustaining economic growth in the near future.

system has tended to benefit mainly the upper castes and classes. By the 1990s, however, almost all Indian and Sri Lankan villages had access to a primary school, and Sri Lanka had achieved an adult literacy rate of 88 percent, the highest in the subcontinent. India's, by comparison, was only 48 percent. Better rural education facilities are steadily being provided in Bangladesh, Pakistan, Bhutan and Nepal. In Bangladesh, for example, government expenditure on education ranks below defense (less than one-fifth of the total) but above debt servicing, subsidies, social services, justice and the police.

#### Pockets of poverty, patches of wealth

Within India, rural poverty is lowest in Punjab in the northwest and highest in Bihar and the surrounding northeast. Himachal Pradesh, on the northeastern border of Punjab, boasts the lowest incidence of urban poverty, while the governments of Andhra Pradesh and Kerala in the south, and West Bengal in the northeast, have been the most successful in relieving local poverty. Bangladesh, starting from a much weaker position than its neighbors, has a severe eastern-northwestern divide in terms of the prosperity brought by industrial development. The eastern division bene-

fits significantly from the services and facilities based in the country's two major cities, Dhaka and Chittagong; the northwest has no comparable urban centers. In 1970, Bangladeshis living in urban areas earned five times more per capita than those in rural areas, and this disparity has increased over time. In addition, two-thirds of Bangladesh's food aid rations go to the major cities. Within these cities, priority groups such as defense workers, civil servants and the police get the lion's share. The remaining third is distributed in rural areas to a population which, although resourceful, is fighting an uphill battle for survival.



# Women in the economy

Across the Indian subcontinent, economic well-being varies with class, caste and geography; but within all these groupings there is one additional division – gender. South Asian women are frequently denied access to wealth, waged employment and property ownership in a way that men are not; and female children tend to have less access to healthcare and nutrition. All these are factors which, along with reported cases of female infanticide, help to account for the region's rising ratio of men to women.

This trend is the result of deeply ingrained cultural and social practices, which often limit the economic participation of women. Many Muslim and Hindu women go veiled in public and in some areas women are secluded in their houses between the onset of puberty and marriage. Particular types of work such as agricultural labor and trading are fre-

quently out of bounds to women, and social contact is limited.

Women of lower castes and classes tend to be less restricted in the types of work that are socially permitted to them. They are frequently involved in work outside the home while their higher caste counterparts are restricted by the fact that they are not allowed to perform ritually polluting or physically dirty jobs. Women's wages tend to be substantially lower than those for men, though in India this disparity has decreased in recent years, except in the Punjab. Nevertheless, many employers feel strongly against hiring women and they are at a particular disadvantage when applying for higher income jobs.

In addition, many parents are opposed to educating girls. Wealthier parents may regard education as a way of increasing the girls' value for marriage but poor

**Backbreaking work** (below) Women sweep the floor in a plywood factory in Bhutan, one of the poorest countries in the world. A practical, widespread, if physically demanding solution to childcare is adopted by strapping children to their backs as they work.

**Going to market in Jaipur** (right) Middle-class Indian women, in spite of increasing education, are more likely to participate in the economy as consumers than as producers. Those who wish to work may be frustrated by the job shortage as much as by social opposition.







families cannot afford the cost of school clothes and equipment. An emphasis on early marriage, often between children, added to the need for girls to help at home, further lessens their chances of going to school. As a result, levels of female literacy in rural areas are significantly lower than those of men. There are some exceptions to this general rule. In Kerala in the south of India local authorities have promoted education for women for many years and female literacy levels there now stand at 90 percent.

Women throughout the subcontinent receive less medical treatment than men, and if they are seriously ill they often have to make do with cheaper, traditional forms of care. Many women suffer from anemia and malnutrition, especially when nursing or pregnant, and there are high female mortality rates in childbirth. In Bangladesh, more than 14 percent of girls are severely malnourished compared with 5 percent of boys. Female life expectancy – unlike the dominant trend in the west – is lower than that of men in all countries except Sri Lanka. In India, the number of women who die during childbirth (5 per 1,000 live births in 1980, not counting miscarriages and abortions) is among the highest in the world.

Nevertheless, healthcare for women has improved over the years. Child immunization linked with basic healthcare and nutrition programs have been encouraged throughout the region. In addition, state departments, nongovernmental organizations and international aid foundations have funded welfare programs. These include training for midwives, nurses, female doctors and local helpers; prenatal, delivery and postnatal care; child feeding and daycare centers for working women and programs that offer food in return for labor.

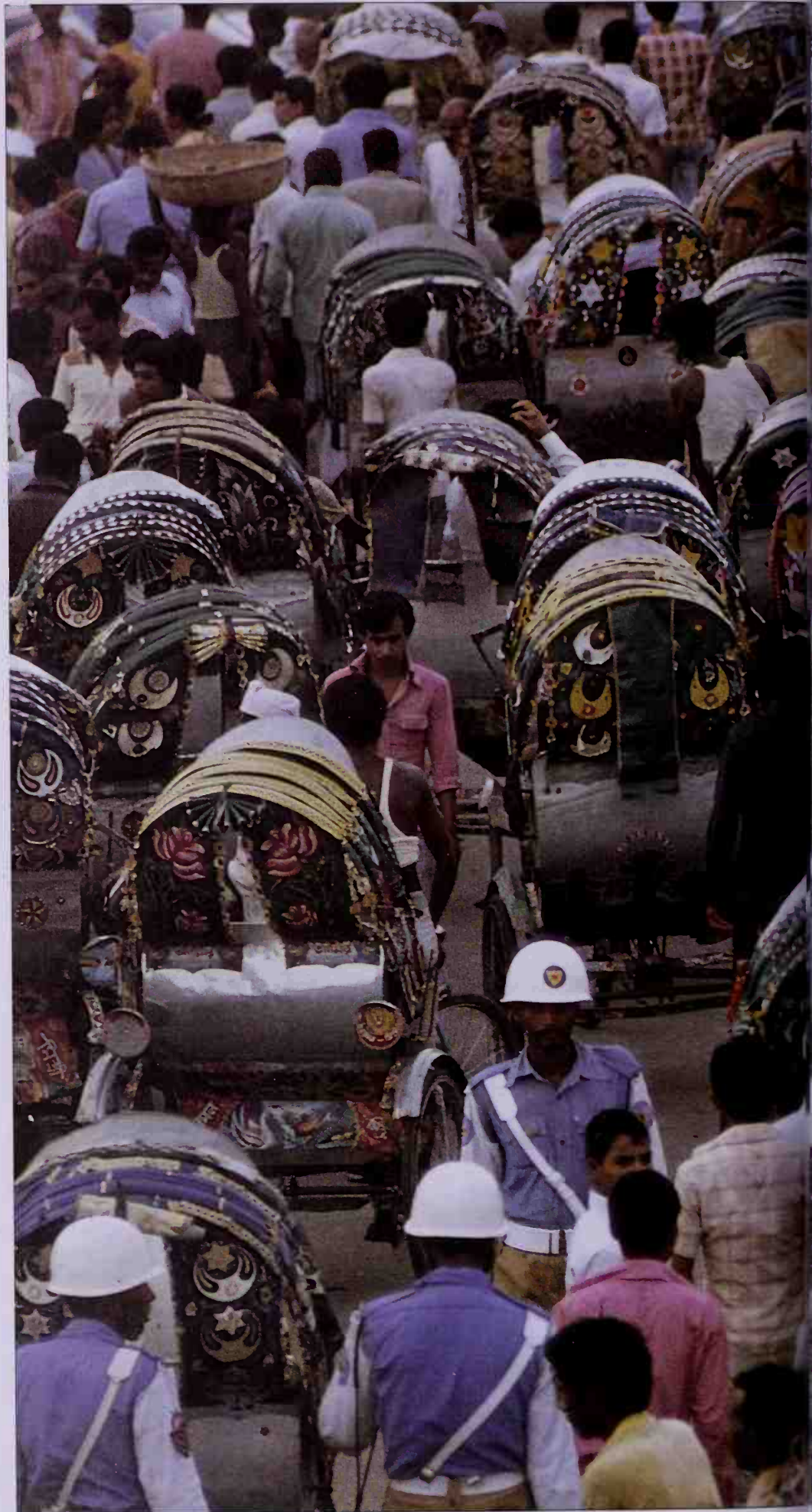
There is still a long way to go before women in the subcontinent are in a position to win real control over their own economic affairs. However, local women's movements are growing and are increasingly well organized. One notable example has been the Chipko movement in the Himalayan region of India. There, women are expected to collect forest litter and firewood so they depend on the trees for survival and are more aware of their value than their menfolk. The Chipko movement encourages villagers to stand up in opposition to timber companies to protect their forest-based livelihoods.



## City transportation

Local transportation through the streets of Dhaka and other cities throughout south Asia is controlled by an army of rickshaw wallahs. In New Delhi three-wheeled scooters work as auto-rickshaws, but in Calcutta and Dhaka, cycle and hand-pulled rickshaws are the norm. Rickshaw wallahs throughout India and Bangladesh often work long days for low wages, carrying all manner of goods and people around cities not always designed for motorized forms of transportation. These cities could not function without their services.

The rickshaws themselves are rarely owned by their operators. Most are owned by small, family companies and lent out to the rickshaw wallahs for a sizable share of the profits. In some cases a rickshaw wallah can buy his own rickshaw from the manufacturer with the aid of a bank loan. Efforts are afoot in many south Asian cities to provide loans on more favorable terms to some rickshaw wallahs from government-owned or cooperative banks.



**Rickshaw wallahs** pulling highly decorated rickshaws through the crowded streets of Dhaka in Bangladesh.







# PEOPLES AND CULTURES

A SUCCESSION OF CULTURAL INFLUENCES · ETHNIC AND RELIGIOUS DIVERSITY · CULTURES IN CONFLICT

The enormous cultural diversity of the people of the Indian subcontinent is reflected in the vast numbers of languages spoken, and in the variety of their beliefs, customs, diet and dress. The diversity is both a response to the region's range of natural environments, and the result of successive migrations of people over the centuries who have spread new cultural influences and modified others – a process that has continued into relatively modern times. Conversely, a number of indigenous religious cultures now have worldwide distribution, including Hinduism and Buddhism. In spite of the region's cultural complexity, several unifying features can be identified, most particularly the caste system, which affects a great many aspects of life, and the common experience of British imperialism.

## COUNTRIES IN THE REGION

Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

## POPULATION

India	853 million
Bangladesh	115.6 million
Pakistan	112 million
Nepal	19 million
Sri Lanka	17.2 million
Bhutan	1.5 million
Maldives	215,000

## LANGUAGE

**Countries with one official language** (Bengali) Bangladesh; (Divehi) Maldives; (Nepali) Nepal; (Sinhalese) Sri Lanka; (Urdu) Pakistan

**Country with two official languages** (English, Hindi) India

**Country with three official languages** (Dzongkha, English, Lhotsam) Bhutan

India has 14 officially recognized languages. As well as Hindi and Urdu, the most significant languages in the region include Gujarati, Malayalam, Marathi, Punjabi, Tamil and Telugu. There are hundreds of local languages and dialects

## RELIGION

**Countries with one major religion** (M) Maldives, Pakistan

**Countries with two major religions** (B,H) Bhutan; (H,M) Bangladesh

**Countries with three or more major religions** (B,H,M) Nepal; (B,C,H,M) Sri Lanka; (B,C,H,J,M,S) India

Key: B–Buddhist, C–Various Christian, H–Hindu, J–Jain, M–Muslim, S–Sikh

## A SUCCESSION OF CULTURAL INFLUENCES

From earliest times, the fertile flood plain of the Ganges, in the north of the region, provided an attractive habitat for people, and archaeological evidence suggests that farmers were settled here 8,000 years ago. An early urban civilization developed in the Indus valley, in the northwest, in the 3rd millennium BC, and extended over the whole of present-day Pakistan and well into northwestern India. Excavation of its scattered sites, the best known of which are Mohenjo-daro and Harappa, reveals a distinctive culture, with characteristically decorated pottery and sculpture, a developed town planning, and a binary method of counting.

### People from the north

About 1500 BC, groups of seminomadic people, known as Aryans and probably originating in central Asia, moved into the Ganges basin from the north, forcing the original inhabitants, the darker skinned Dravidians, to move south. These newcomers spoke Sanskrit, an early Indo-European language related to modern Hindi, widely spoken in northern India today. Their oral traditions are preserved in the books of knowledge – the Vedas, the Brahmanas and the Upanishads – and the classic epic poems, the *Mahabharata* and the *Ramayana*, that still make up the sacred (Vedic) literature of Hinduism.

Gradually the Aryans became scattered in a number of states ruled over by kings. Society was divided into four classes, or castes – priests (*brahmins*), warriors, farmers and traders, and servants – and it was at this time that the hierarchical caste system, which ranks individuals by birth, began to develop. Buddhism, which originated in northern India in about 500 BC, inspired by the teachings of Siddhartha Gautama, the Buddha (Enlightened One – c. 563–483 BC), came about as a reaction to such aspects of Hinduism. Both Buddhism and Jainism, which had developed a century earlier and is still practiced in parts of northern India, believed in the basic holiness of individuals (in the case of the latter, of all life) and their ability, through their own actions, to attain enlightenment, irrespective of their social status.

The monastic structure of Buddhism, with its emphasis on alms-giving and

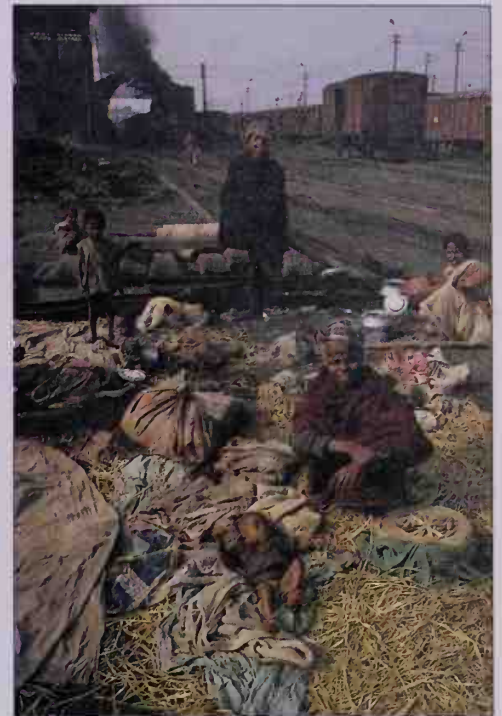
preaching, gave it a missionary character that helped it spread throughout the subcontinent and beyond. It reached Sri Lanka from southern India about the 3rd century BC and was later carried to the Maldives by the earliest settlers of the islands. Buddhism continued to be a strong cultural and social force in India until 600 AD, but the decline of the Mauryan empire (321–185 BC), which had unified the entire subcontinent under its rule, was followed by political fragmentation and the emergence of independent states including the Himalayan kingdoms of Nepal, Kashmir, Bhutan and Assam. Hinduism gradually took over from Buddhism as the dominant ideology, its caste system bolstering the feudal government of local noble families. Regional loyalties supplanted the political unity of the previous empires and local cultural traditions flourished.

External influences were also woven into the subcontinent's cultural tapestry. In the south, trade with Europe and Asia influenced historical development. The introduction of Christianity is attributed to St Thomas, one of Christ's twelve apostles, but it is more certain that traders from the Middle East founded churches on the southeast coast at the beginning of the Christian era. Reference is also made in some 5th-century records to a white Jewish community at Kerala. The Parsis, practicing Zoroasterianism, a religion that originated in Iran, migrated to India in about the 8th century to escape Muslim persecution; today they are concentrated in the cities of Karachi (Pakistan) and Bombay. In the north, links were developed through Nepal and across the Himalayas with China and Tibet.

### Invasions of the recent past

About 1000, Muslim invaders from central Asia spread across the plains of the Indus and Ganges, establishing full control there by the 13th century. They had a profound effect on cultural development, particularly in architecture and the arts, and through their distinctive system of Islamic laws and style of government. Under the powerful Mogul empire, from the mid 16th century to the mid 18th century, present-day Pakistan, Bangladesh, and much of India were consolidated under one Muslim ruler and one bureaucracy. Only Nepal, Bhutan, Assam, India south of the Deccan and Sri Lanka remained outside Islamic influence.



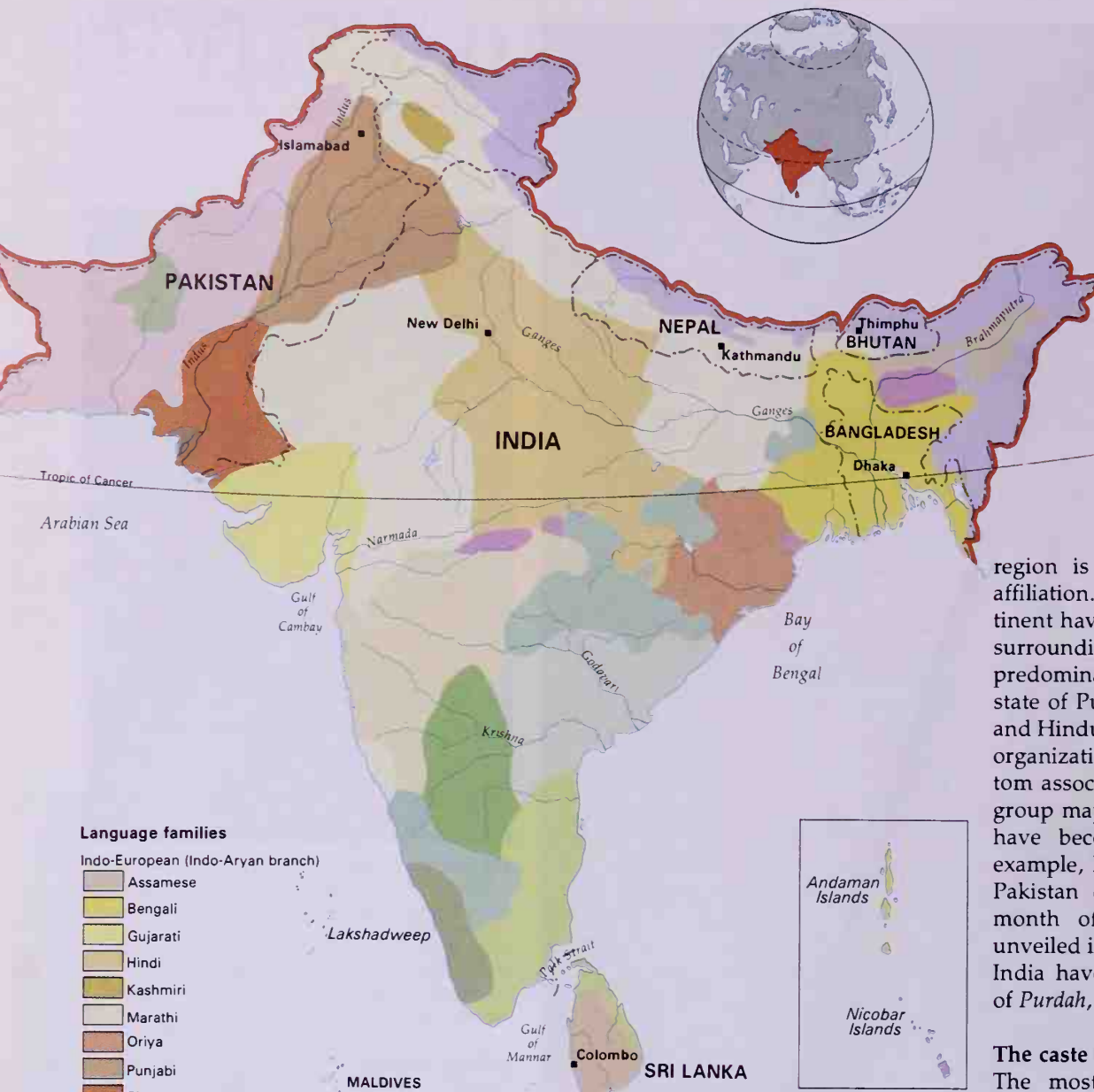


**Life beside the tracks** (above) A family makes a home alongside the railroad tracks at Patna in Bihar state, one of the poorest areas of India. Rural poverty forces many people to migrate to the cities in search of work, and the railroads are their main means of transportation. Most of the railroad system was built by the British during their imperial rule in the subcontinent, a useful legacy of colonialism.

**A Sri Lankan devotee** (left) gazes up at a statue of the Buddha. Images of the "Enlightened One" are important features of Buddhist holy places, used as a focus for meditation and to inspire reverence for his teachings and example. Effigies are found in a variety of postures – meditating, teaching or reclining – that represent different aspects of the Buddha's life.

A final strand of cultural influence was introduced by the British, who held political sway in all the present-day countries of the region, except Bhutan, Nepal and the Maldives, from the 18th century until independence in 1947. They brought the Protestant tradition of Christianity and inaugurated widespread changes in government, administration, the legal system, transportation and communications, agriculture and trade. Public buildings, churches and railroad stations were built in the grandiose Gothic style favored by the 19th-century British. They even introduced cricket, which remains a popular national sport in India, Pakistan and Sri Lanka. They also encouraged the migration of large numbers of people from the subcontinent to the Caribbean, eastern and southern Africa, Fiji and other parts of the British empire, to provide labor on plantations.





**Indian women (right)** gather to worship Lakshmi, the goddess of wealth and beauty. Festivals occur frequently in the Hindu calendar and are woven into the fabric of daily life

**Linguistic diversity (left)** Most of the hundreds of languages spoken in the region belong either to the Indo-European family (in the north) or the Dravidian family (in the south). Urdu (related to Hindi) is the official language of Pakistan, though it is the mother tongue of only a small percentage of the population.

region is also determined by religious affiliation. All the religions of the subcontinent have been shaped by their cultural surroundings – Sikhism, for example, the predominant religion of the northwest state of Punjab, blends elements of Islam and Hinduism. As a result, forms of social organization, daily observance and custom associated with a particular religious group may extend beyond that group, or have become modified within it. For example, Ismaeli Muslims in the north of Pakistan do not observe the Ramadan month of fasting, and women travel unveiled in public. Hindus in the north of India have adopted the Muslim practice of *Purdah*, or female seclusion.

### The caste system

The most pervasive cultural influence throughout the subcontinent is the caste system. Although Hindu in origin, it affects all people within society, despite the emphasis that Islam, Christianity, Buddhism and Sikhism place on equality between individuals. Caste determines the individual's economic and social standing from birth. Within its four broad categories, society is divided into thousands of hierarchical but mutually interdependent ranks with defining rules of behavior. In rural communities, it governs the network of obligations and services between landowners and tenant peasant farmers.

A central element in caste is the concept of pollution; this links caste ideology with social practice and presupposes a set of ideas concerning the relationship between spiritual and physical life. The lowest caste rank were the untouchables, or Harijans. Traditionally, they were placed outside society because their habits of life involved polluting activities, such as killing animals, treating the hides of cattle, sweeping and cleaning, and disposing of human excrement. Orthodox Hindus

its peoples. A vast number of languages, dialects and subdialects are spoken by the subcontinent's millions of people. In India 15 languages are officially recognized. The constitution of the newly independent Republic provided that Hindi should become the official national language. English, though not classified as an official language, would be retained in use until 1965, when it would be replaced by Hindi. Since it is claimed as a mother tongue by some 150 million speakers in northern India and is related to some other northern languages, such as Gujarati and Punjabi, Hindi has some entitlement to be regarded as the lingua franca of the north, but it has little in common with the Dravidian languages that are widespread in the south, including Tamil, Telugu, Kannada and Malayalam. Southern states have consequently resented attempts to promote Hindi as a national language and, to avoid sectarian strife, English continues to be used as the language of government.

Group cultural identification within the

## ETHNIC AND RELIGIOUS DIVERSITY

The population of the Indian subcontinent has mixed to such a degree as a result of its long history of migration and invasion that language rather than ethnic origin is the primary distinction between





### FOOD CUSTOMS

A Hindu proverb that "caste is only a question of food" provides an insight into the cultural significance of food and its preparation. Environmental factors probably played a part in shaping differences of diet and food taboos originally, but subsequent patterns of migration, religious belief and caste behavior have had greater influence. The best known of the rules relating to diet are the prohibitions that prevent Hindus from eating beef, out of respect for the cow's sacred status, and Muslims from eating pork. Vegetarianism, which is widespread throughout the region, and is particularly strong in southern India, reflects the doctrine of *ahimsa*, or reverence for all life, that is fundamental to Buddhists and Jains as well as many orthodox Hindus.

Notions of purity and pollution affect many of the customs surrounding the eating of food. Traditionally, Hindus would not accept food prepared by someone belonging to an inferior caste. Only the right hand is used to carry

food to the mouth, the left hand being considered ritually impure. Menstruating women are still considered unclean in many households and are forbidden to cook at this time.

The distribution of food is also culturally determined. Women often eat after the men of the household have finished, a custom that has serious implications for their health.

**Pakistani Shi'ite Muslims** eating during a festival. Certain foods hold significance in different religious celebrations.



regarded the hill tribes as untouchables because they ate beef. The untouchables were often segregated in hamlets outside towns and villages, and forbidden entry to temples and schools, or from drawing water from wells used by higher castes.

Although many caste taboos with regard to eating, drinking and dress have been relaxed, their legacy is apparent in a bewildering variety of behavioral patterns found throughout the subcontinent. By and large, marriage still takes place within caste categories, thus preserving these cultural traditions. The economic function of traditional caste occupations has diminished over time but the old jobs are often replaced with similar substitutes, and occupational mobility tends to be greater among the higher castes who have the advantage of better education and higher literacy.

### A prescribed role for women

Although the rapid modernization of society has modified many traditional cultural practices, particularly among more wealthy urban groups, women of every class remain subject to the cultural stereotyping that dictates their social behavior and determines their expectations. For all religions and castes, marriage is a universal goal; it is therefore difficult for women to remain single or to combine marriage and motherhood with a career. Even in the cities there is continued reliance on the practice of arranged marriage; in the absence of a network of relatives and friends to find a bride of suitable family and caste, such as exists in small rural communities, advertisements are very often placed in newspapers and magazines.

Such marriages strengthen the authority of parents and elder relatives, and ensure conformity to traditional roles. Once married, a woman is expected to fulfill the part of dutiful wife, mother, and, very often, daughter-in-law: it is still common practice for married couples to live with the husband's family. Only when a woman becomes a mother-in-law herself is she likely to attain freedom and authority. The persistence of the traditional images of women conflicts with the ideas and expectations of the increasing numbers of women emerging from higher education and into the formal workplace today. However, a major factor in their perpetuation appears to be the conservatism of women themselves.





## CULTURES IN CONFLICT

During the second half of the 20th century the Indian subcontinent has seen a considerable increase in communal violence. There are several underlying reasons. The ending of British rule in 1947–48 removed a common cause for cooperation between cultural and ethnic groups and – despite the efforts of the politicians and administrators – the new national and state boundaries did not correspond to the major religious and linguistic divisions. Furthermore, in the past the widespread caste system had maintained both the economic interdependence and social separation of different groups within society, ensuring their peaceful coexistence. In the course of the 20th century, however, society has been transformed by a rising level of education and reforms of the economic and social structure, particularly in the rapidly growing cities. Population growth means that more and

more people are seeking to share in economic and political power. Clashes that appear to be based on ideological and cultural differences between ethnic groups or castes are fueled by economic and political disaffection. For example, the demands of the Indian southern states for the promotion of the Dravidian languages were linked to a belief that the government had been dominated by the north. As a result, it was asserted, the south had been prevented from sharing in industrial and economic development.

### The role of religion

More than any other cause, religious differences provide a focal point for sectional conflict in the subcontinent. In India, where Muslims account for only 11 percent of the population, concentrated mainly in the northwest, and in the state of Jammu and Kashmir in particular, violence between Muslims and Hindus is increasing. Some 60 intercommunal riots were recorded in 1960; in 1986 it had risen

to 500, and tension has intensified since then. At the center of clashes in the early 1990s were claims that a disused Muslim mosque lay on the site of an ancient Hindu temple.

The regional strength of Sikhism also lies in the northwest, in the Punjab, where it was founded in the 15th century. Its adherents observe strict laws of obedience, set down in the *Adi Granth*, the Sikh sacred book, written in Punjabi. At independence, the Punjab was partitioned between Pakistan and India. Amid extreme violence and loss of life, a mass exchange of population took place, with about 2.5 million Sikhs moving into Indian East Punjab, and equal numbers of Muslims crossing to Pakistan. Sikhs now form a majority in East Punjab, though only about 2 percent of the total Indian population. The demand for a separate Sikh nation has led to frequent clashes with the national government.

Despite the ostensibly ethnic basis of their separatist claims, conflict in the





**Untouchability** (above) Although untouchables were renamed Harijans (children of God) by Mahatma Gandhi (1869–1948), who worked for their emancipation, they are still to be found doing the dirtiest and most menial jobs.

**City life** (left) A movie poster dominates the other signs mounted high above this crowded Bombay street. The Indian movie industry is the largest in the world, offering an easy escape route to romance and adventure.

Punjab must also be seen in its economic context. Living in one of the most affluent states in India, Punjabis resent the authoritarian rule of the national government in New Delhi and the seemingly one-way transfer of resources from their state to the rest of the nation. At the same time, the mechanization of agriculture and insufficient investment in industry has led to increasing unemployment among young Sikhs. For the poorly educated, unemployed farmer, a career in terrorism can reap rewards.

Such incidents are matched elsewhere in the region. Rioting has become endemic in Sindh province in Pakistan. Here the principal clashes take place between the rural Sindhi population and the Urdu-speaking Muslims who settled there after partition. Among the demands of the Sindhi nationalists are the promotion of the Sindhi written language and cultural heritage.

Race and mythology have been used to fuel conflict in Sri Lanka. After inde-

pendence, the ruling Sinhalese majority stressed their Aryan ascent to promote their image as custodians of Buddhism; Sinhalese was established as the official language, and the mainly Hindu Tamil minority were excluded from a share in economic resources. After centuries of peaceful coexistence, relations between the two groups deteriorated to produce one of the most divisive and bitter of the ethnic separatist conflicts in the region.

#### Caste conflicts

Not all conflicts are regionally or territorially based. The "Scheduled Castes Movement" is concerned with the protection of the untouchables, a vulnerable minority in all regions. The label of untouchability has provided a sufficiently cohesive force that transcends cultural and economic differences between those that carry it. In recent years many untouchables have converted to Buddhism, theoretically a casteless religion but the label of untouchability continues to affect their quality of life. Attempts to introduce legislation to end discrimination against untouchables, such as the enforced use of quota systems to ensure places for lower caste members in education and government offices, have heightened the tide of feeling against them. The announcement in 1990 that 27 percent of government and public-sector jobs were to be set aside for "intermediate" or "backward" castes provoked riots in several states, with upper caste students protesting that merit rather than caste should determine employment.

#### ETHNIC DIVERSITY IN NEPAL

Nepal is a country of great geographical and ethnic variety. It comprises a myriad of ethnic groups all with their own languages, cultures and religions. Broadly, two external influences can be identified: the Tibeto-Burman from the north and the Indo-Aryan from the south. However, shamanist and animist practices are also strongly integrated in the Nepali culture. In the Himalayan villages, religious paintings, architecture, festivals and ritual ceremonies are more likely to be in the Tibetan Buddhist style. In the central hills, Hindu and Buddhist influences blend harmoniously. The Magars, for example, are of Tibeto-Burman origin, but many of them are nominally Hindu. Hinduism becomes increasingly more orthodox traveling down to the plains in the south.

For many years Nepal has been portrayed as a peaceful haven, free of external and internal conflict. As such, the country, and most particularly its capital, Kathmandu, became the destination for hippy pilgrims from the West on the trail of *nirvana* in the 1960s. For many Nepalis, the effects of mass tourism have been negative, and fears about hard drug usage contributed to much stricter visa controls in 1984.

The picture of Nepal as a harmonious kingdom was shattered in 1990 when strikes and demonstrations were met with curfews and killings. The popular movement for democracy in Nepal arose in protest against the partyless system of politics in the country and the power of the monarchy. While many Nepalis continue to recognize their king with reverence and affection (for many he is a descendant of the Hindu god Vishnu), calls for democracy were sufficiently strong to bring about a break in tradition.

A number of students set fire to themselves to reveal their depth of feeling.

For a number of years individual states (particularly in the south of India) have been setting high quotas for backward caste places. The attempt to implement this policy on a nationwide basis has met with widespread protest from those who suggest that the backward castes do not suffer as much discrimination as the untouchables and tribespeople (for whom the quota system was first established) and that the reservation system enhances rather than defuses caste feeling.



# Hinduism: an ancient religion

Hinduism is one of the world's oldest religions. It was developed by the Aryan invaders of the subcontinent between 1400 and 500 BC, and has been the major influence on the nature and organization of society, economy and culture within the region. Today it has more followers than any other religion in south Asia. The central concept of spiritual progression by reincarnation, or rebirth in a new form after death, provides an organizing principle for all aspects of Hindu life.

The caste system is a clear example of Hindu philosophy in action, each social caste indicating a person's spiritual status. At the top of the ladder the "twice born" castes – Brahmin, Kshatriya and Vaisya – are all closest to liberation from the wheel of birth, death and rebirth. Beneath all the castes are the untouchables who, because of their "polluted" status, have traditionally carried out the most menial and degrading tasks. The law of *karma* justifies this system of social differentiation, as an individual's position in life is considered to have been determined by his or her deeds and conduct in previous lifetimes. *Karma* also provides a strong incentive to conform to the laws and duties defined by an individual's *dharma* or moral code: not to do so may result in a lower reincarnation.

Traditional rites-of-passage are performed to prepare the incarnating soul. "Twice born" males, for example, receive a sacred thread made of cotton, wool or hemp (according to status) when undergoing their "spiritual birth". Marriage ceremonies are highly ritualized, often taking a number of days. In Bengal, among the Hindus of the upper class, the bride-to-be may take a ceremonial bath in water from the Ganges, the sacred river, several times a day to purify her body and her soul. During the actual wedding ceremony the girl makes the same offerings to her husband as she makes to the deities in the temples, symbolizing devotion to her spouse. Death rites are also important in Hindu society. Traditionally the dead must be carried to the riverside by their relatives, placed on a pyre and cremated. The mourners may bathe in the river for purification.

## A living religion

The Hindu religion is essentially monotheistic, the many gods and goddesses symbolizing aspects of the one, omnipresent God. Nevertheless people choose

to worship specific deities, the choice being governed by an individual's problems, caste or inclinations. Worship or *puja* is a very important part of everyday life and every orthodox Hindu's home, ranging from that of the urban elite to the slum dweller, has a domestic shrine where representations of the chosen household deity are placed, offerings of incense, food or flowers made, and daily prayers offered.

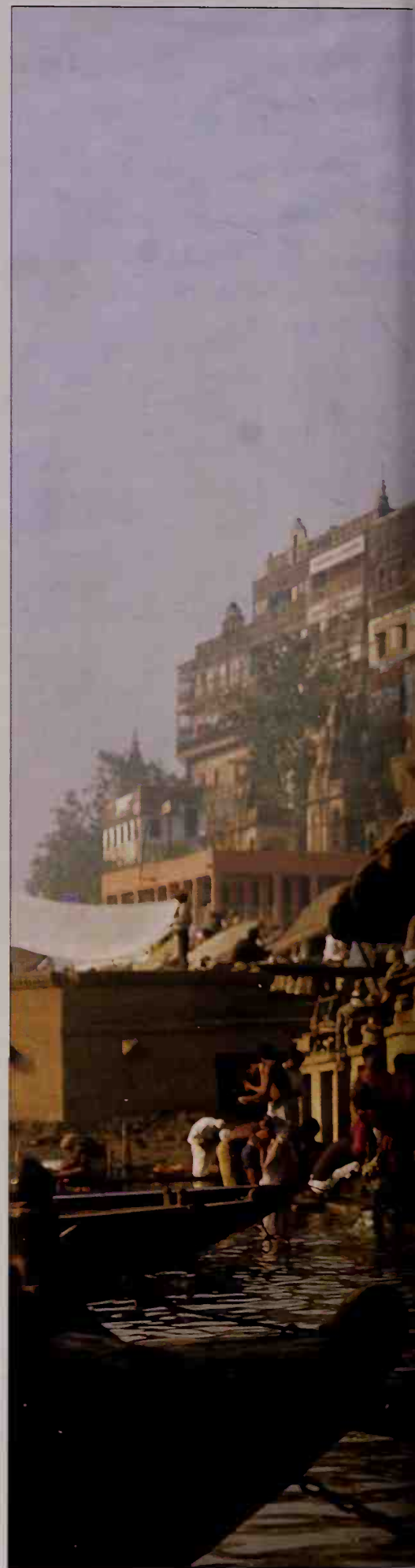
Pilgrimages to holy rivers such as the Ganges, the great number of religious festivals and the proliferation of temples and shrines bear witness to the importance of religious belief. Hinduism has no formal creed and rites and ceremonies vary enormously, though certain festivals such as Divali (the festival of lights) are held throughout India. During Holi, which is celebrated mainly in northern India and Nepal, devotees throw colored water and powder at each other.

Hindu mythology continues to be a major inspiration for culture and the arts, and for popular entertainment. A rich oral tradition of village storytellers kept the myths and legends alive. Today these myths are disseminated more widely than ever through the mass media; radio stations broadcast devotional songs, and bookstalls display brightly colored comic books retelling the epics, which have also been the subject of popular cinema and television movies.

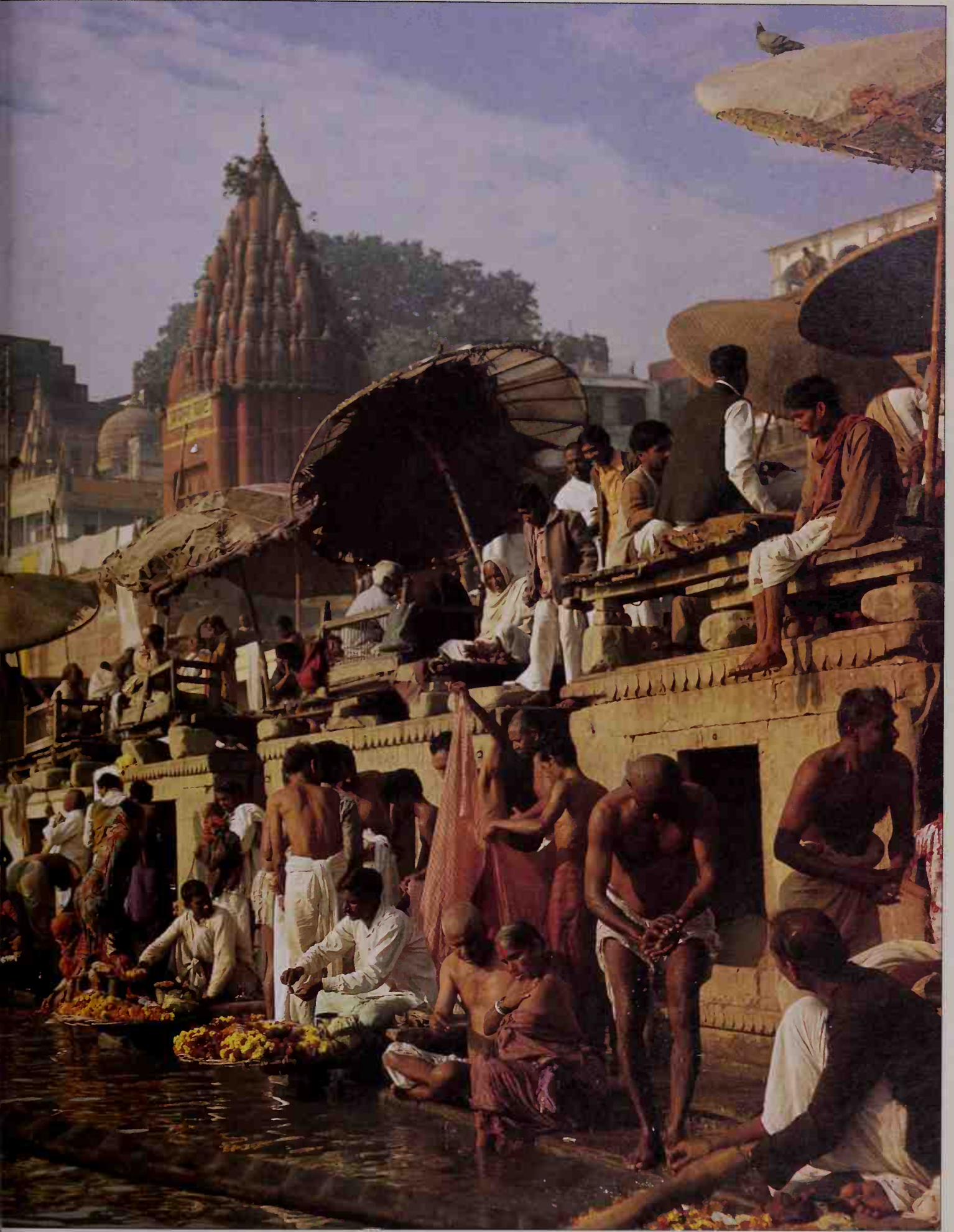


**Simple shrines** (above) are found in many Hindu homes, providing a place where the daily *puja* can be observed. Their presence underlines the central role that religion plays in everyday Indian life.

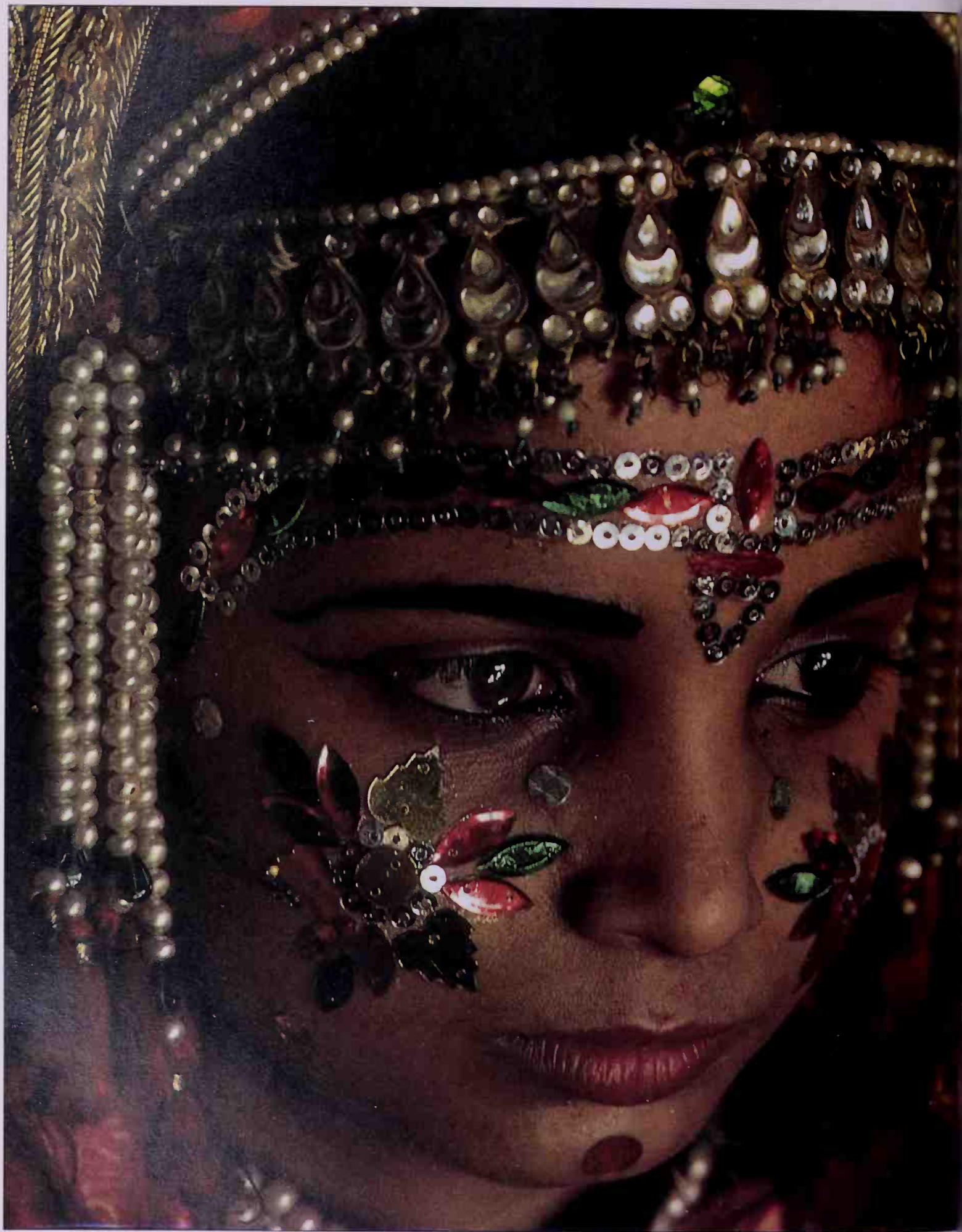
**Varanasi on the Ganges** (right) is Hinduism's most sacred city. At dawn the riverside steps (*ghats*) are crowded with pilgrims who have come to worship and bathe in the holy river, and cremate their dead.













## Hindu theater and the *Ram Lila*

After the monsoon rains have ended the festival of Dassara is celebrated across northern India. In villages, small towns and big cities, local communities get together to perform the *Ram Lila*, one of the major Hindu theatrical traditions. Each evening, for a period lasting from 10 to 30 days, casts of amateur actors present episodes from the life of Ram to large audiences in outdoor arenas.

The aim of the play is to give the audience a glimpse of a deity – in this case Visnu, of whom Ram was the seventh earthly manifestation – and so inspire feelings of personal love or devotion, known as *bhakti*. Visnu is the sustainer, who delivers the world from the threat of demonic forms. In the story, Ram is denied his rightful throne by his jealous mother, exiled, and obliged to battle with the evil Ravan to rescue his wife, Sita. Having overcome Ravan he reclaims his throne and restores order. Ram and Sita are therefore ideals of Hindu masculinity and femininity. Ram is just and self-possessed, while Sita is modest, shows fidelity, and is never heard to complain.

The performances of the *Ram Lila* are organized by local committees and financed by small subscriptions. Each year young boys from the Brahman caste are selected and trained for the major roles. They wear elaborate make-up and costumes, and once fully dressed, become the divine embodiments (*svarupas*) of the characters they play – and so must be carried to the playing arena. The audience is not limited to Hindus, though in recent years the nationalistic overtones of the *Ram Lila* story have been the cause of some friction within religiously mixed communities.

**Epic performance** A young boy wearing elaborate make-up and jewelry plays the part of Sita, the wife of Ram, at a staging of the play in Varanasi.



# CITIES

ANCIENT URBAN ROOTS · THE URBAN BOOM · CHALLENGES FOR THE FUTURE

**M**ost people in the Indian subcontinent are still rural-based, living in small farming communities and villages. Yet so great is the total population of the region that the number of urban-dwellers is a staggering 250 million, and its cities are among some of the most crowded in the world. Urbanization has ancient roots in the Indian subcontinent, and settlement patterns are highly diverse, reflecting the rich combination of geographical, climatic, social, religious and ethnic forces that have shaped the region. A series of invading powers, most recently the Moguls and the British, have left their mark on the urban scene. More recently, urban infrastructures and services have been unable to keep pace with soaring populations: unemployment, poverty and a shortage of housing are ever-present problems.

## ANCIENT URBAN ROOTS

The Indian subcontinent has a long history of urbanization. A complex urban civilization is known to have flourished in the Indus valley, in what is now Pakistan, between 3000 and 1500 BC. This consisted of a network of over 100 settlements, and excavations have revealed that the two largest, Harappa and Mohenjo-Daro, had populations of over 50,000 as well as a formally planned city structure with complex sanitation arrangements and an advanced system of local government.

To the southeast of this early cradle of civilization lies India's fertile Indo-Gangetic plains. From 1500 BC invading Aryan, Hindu and Muslim peoples in

turn sought to command and expropriate the rich resources of this area, building fortified towns and palaces to exert control over the agricultural population. The latest and most splendid of these empire-builders were the Moguls (1527–1707) who, in a golden age of art and architecture, created some of the region's most enduring and romantic urban structures. The magnificence of their palaces, fortresses and mosques can still be seen in such sites as the abandoned city of Fatehpur Sikri and the glorious mausoleum of the Taj Mahal at Agra.

The most significant influence on contemporary urban patterns in the region, however, is the legacy of two centuries of British colonial rule. The subcontinent – the “jewel in the crown” of the British empire – provided primary resources for

### COUNTRIES IN THE REGION

Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

### POPULATION

Total population of region (millions)	1129.5
Population density (persons per sq km)	289.6
Population change (average annual percent 1960–1990)	
Urban	+4.5
Rural	+2.3

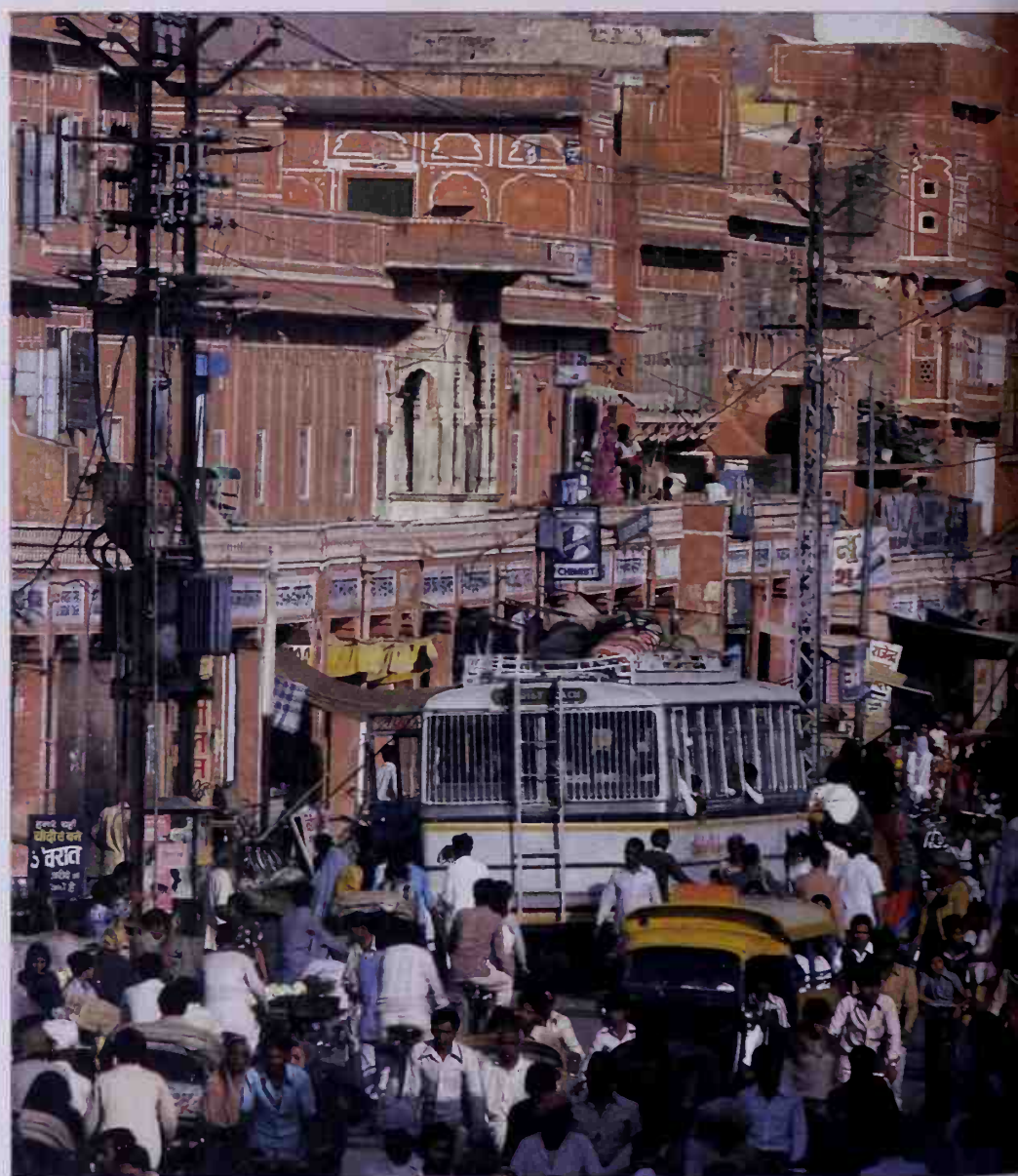
### URBAN POPULATION

As percentage of total population	
1960	19.2
1990	28.6
Percentage in cities of more than 1 million	4.8

### TEN LARGEST CITIES

	Country	Population
Calcutta	India	9,194,000
Bombay	India	8,243,000
New Delhi †	India	5,729,000
Karachi	Pakistan	5,181,000
Dhaka †	Bangladesh	4,770,000
Madras	India	4,289,000
Lahore	Pakistan	2,953,000
Bangalore	India	2,922,000
Ahmadabad	India	2,548,000
Hyderabad	India	2,546,000

† denotes capital city







#### Map of population density (above)

India alone has more than 200 large cities. Population densities are greatest on the coasts, on the southern tip and across the northern floodplains of the Indus and Ganges rivers, extending from Pakistan to Bangladesh.

**City of princes (left)** Jaipur in northwest India was founded in the 18th century by Maharajah Jai Singh, who ordered its buildings to be painted pink, an auspicious color. Today it is a lively commercial and industrial center with crowded modern suburbs and a population of more than 1 million.

industry and a market for manufactured goods. New urban centers linked by an extensive railroad system were created to serve Britain's colonial interests. Bombay, Calcutta and Madras in present-day India, Karachi in present-day Pakistan, and Colombo in present-day Sri Lanka were all developed as ports to facilitate trade with other parts of the farflung British empire, and as administrative centers. Calcutta, the port of the northeast, was the chief city of British rule until New Delhi, in the center of the Ganges plain, was built as the new national capital at the start of the 20th century – a function that the city still fulfills today.

#### Urban diversity

The economic exploitation of colonialism left the newly independent countries of the region with a legacy of underdevelopment and impoverishment. This is all too clearly reflected in the many problems of their cities today. Nevertheless, there is tremendous diversity in the pattern of

settlement around the region, which arises from differences of geography and climate and from great social, religious and ethnic variety.

The more remote states of the region, Nepal and Bhutan have few major settlements. Landlocked in the harsh environment of the Himalayas and their foothills, both have been isolated from outside influences until very recently and follow an almost feudal way of life. Only a tiny fraction of their populations is classified as urban (in Bhutan 4 percent, and in Nepal 7 percent). Most people live as subsistence farmers in small rural communities scattered throughout the land. Urban development is limited to the capital cities, Thimphu in Bhutan and Kathmandu in Nepal.

The islands to the south of the subcontinent are very different. The total population of the 210 inhabited islands of the Maldives is less than 185,000, and of this one-fifth is urban. About the same proportion of Sri Lanka's population of 17 million is also urban-dwelling. Population densities are highest in the west of the island where rainfall is high.

The highly populated countries of Bangladesh, Pakistan and most notably India dominate the urban picture, with 243 million of the region's 250 million urban residents. In 1981 India had 214 cities with 100,000 or more inhabitants. The extended urban areas of its three largest cities – Bombay, Calcutta and Delhi – had populations in 1992 of 12.57 million, 10.86 million and 9.37, and these numbers are growing all the time.





## THE URBAN BOOM

The period since the end of World War II and the securing of independence from British colonial rule has seen startling changes to urban life in the Indian subcontinent. Cities have increased enormously in size, and the proportion of the population living in urban areas has soared. This has been part and parcel of the overall population explosion in the region, brought about by a dramatic decline in mortality rates – the result of better medical control of endemic disease. But – while the region's total population increased by 60 percent between 1965 and 1985 – the urban population more than doubled. This population has increasingly been concentrated in the largest cities. In 1981 the subcontinent had 15 cities with over 1 million inhabitants.

### The urban impact of independence

Independence from British rule had a major impact on urban development. In 1947, British India was partitioned – largely by religion – to form the two new states of Pakistan and India. Pakistan was divided into two separate regions in the northeast and northwest to accommodate the unevenly distributed Muslim population. One immediate consequence was a vast migration – involving as many as 15 million people – as Hindus and Sikhs moved to India, and Muslims to West and East Pakistan (now Bangladesh). In 1946, for example, Lahore (the capital of British Punjab now in Pakistan) had about 600,000 Hindus and Sikhs, accounting for half the population; only about 1,000 remained after partition. Most migrants settled within urban areas and boosted populations accordingly: Karachi in Pakistan, for example, tripled in size between 1941 and 1951.

Partition was to have profound consequences beyond merely enlarging cities. The influx of refugees exacerbated social divisions within urban communities. The majority of people who moved from India to Pakistan settled in the towns and provinces of southwest Pakistan. The economic prosperity of many of these refugees, and their contrasting religious practices and traditions, led to conflicts with the indigenous urban populations. Such differences still form an important part of national politics today.

Some cities were transformed from





**High water** (above) The people of Bangladesh live in precarious and often tragic dependence on their natural surroundings. In this lowland, predominantly agricultural country of high population density, floods can cause devastating damage.

**Growing up** (far left) Bombay's island location allows little room for expansion, and so buildings must reach upward. A commercial and trading city, Bombay's economy has been boosted by offshore oil, and it attracts a stream of rural migrants.



**Sidewalk opportunities** (above) Life in the cities is harsh for many rural migrants, but crowded streets at least offer the chance to earn a living. In the countryside, where landlessness is a growing problem, unemployment and poverty are endemic.

remote colonial outposts into the major commercial, industrial and administrative centers of the newly formed states. Karachi, Pakistan's only port on the Arabian Sea, developed rapidly as the country's chief exporting and manufacturing city, and as its first national capital. Similarly, Dhaka and Chittagong in East Pakistan grew very quickly after the new state of Bangladesh was created in 1971.

Independence also brought the need for new cities. Partition and the loss of Lahore left the Indian province of Punjab without a capital and so a new one, Chandigarh, was built to a modernistic design by the Swiss-born architect Le Corbusier (1887–1965). In 1967 Pakistan moved its capital to the purpose-built town of Islamabad, in the northeast, after Karachi was found to be too far removed from the rest of the country.

#### The pull of the cities

The greatest transforming influence on the subcontinent's major cities has been the scale of migration from the countryside, fueled by a combination of population growth, landlessness and rural unemployment. Migrants are attracted to cities by the perceived advantages they offer – employment opportunities, higher wages, better schools and medical treatment. But urban industrial development

#### SHELTER FROM THE STORMS

Nowhere in the region is human settlement so much at the mercy of the elements as in Bangladesh. Nearly 90 percent of the land is low-lying, formed by the alluvial plains and deltaic islands of the Ganges, Brahmaputra and Meghna river systems. Settlement of this area has always been made vulnerable by the ever-present danger of floods. Whole villages may be swept away overnight, and most have to be built on mud platforms to keep them above water level. However, the population of this agriculturally fertile country has grown from 41 million in 1951 to over 100 million in 1992, placing intense pressure on limited land resources, and multiplying the consequences of frequent natural disasters.

Flooding from the annual monsoon rains is integral to the agriculture of Bangladesh. Plant nutrients are deposited in the silt brought down from the rivers, and new islands are formed. Yet the impact of natural forces can be catastrophic. Tropical cyclones often sweep in from the Bay of Bengal and devastate the densely populated coastal areas. Such floods resulted in over 500,000 deaths in 1970 and upwards of 150,000 in 1991. Most vulnerable to the effects of these natural disasters are the country's millions of landless laborers and peasant farmers. Those that survive are forced to live in squalid conditions in the squatter encampments of Bangladesh's major cities, such as the capital Dhaka, which provide their only source of refuge and livelihood.

has not expanded to meet these demands, and for most newcomers the reality is very different. Many cannot find jobs, and are forced to live in shanty towns or in makeshift shelters on the city streets. Yet, compared to the despair of rural poverty, even the chance of erratic casual earnings in the city's informal economy offers some hope.

Although the urban population is increasingly concentrated in its largest cities, the region has a huge number of smaller towns and villages that are also part of the urban network. These places play an important role as local markets, administrative centers, and sites for processing and distributing agricultural produce. As such, they remain central to the everyday lives of millions of the region's inhabitants.



## CHALLENGES FOR THE FUTURE

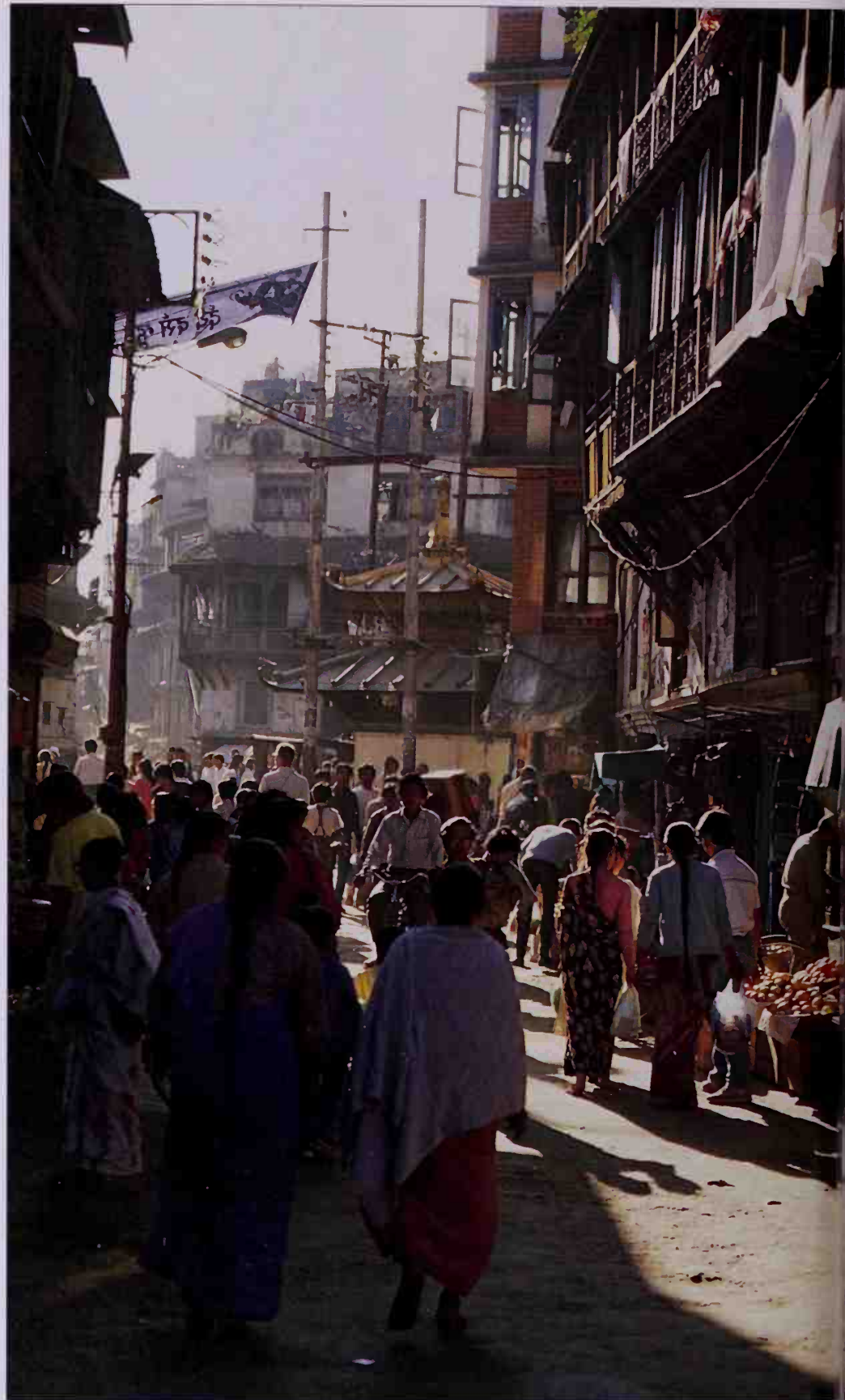
The geographical, social and historical diversity of the Indian subcontinent ensures that each city has its own unique features. Nevertheless, the urban fabric and layout of the city usually give evidence of three distinctive stages of development. At the heart of most cities is the traditional bazaar. Colonialism has left its impact in a gridiron arrangement of streets and in segregated land use areas. Recent commercial and industrial growth has brought unplanned and often chaotic expansion.

### The bazaar and the cantonment

The region's early cities grew as places for agricultural trade, for the performance of religious ceremonies, and as centers of political and military power. Most occupy a strategic site – typically a well-defended position on or near a trading route. A city wall, built for security, encloses a dense pattern of narrow streets, passageways and courtyards. Temple sites dominate the center, and an additional focus is provided by the bazaar – the main market area, usually built at the main road interchange known in northern India as the *chowk*.

In the bazaar city there is no distinction between residential and commercial areas. Dwellings frequently accommodate business as well as housing needs, acting as a place where goods or commodities are produced, stored or traded. Although apparently heterogeneous in structure, the bazaar is usually split along ethnic, religious, linguistic or caste lines into distinctive neighborhoods. It is also common for traders of particular commodities to cluster together, so that there are whole streets of shops selling the same kind of goods. In contrast to the usual pattern in western cities, the most desirable buildings are those closest to the center, and are occupied by the higher class and caste groups, while lower castes and untouchables (or Harijans) are forced to the urban periphery.

Colonialism imposed an alien urban tradition on these existing city structures. The British, the dominant colonial power in the region, introduced European architectural styles and built spacious new settlements, formally planned with symmetrical street patterns. In marked contrast to the bazaar, there was strict separa-



tion of residential, commercial and retail areas. The military were accommodated in "cantonments"; civil servants and the business community were housed in "civil lines". The British community was segregated from the indigenous population, both in the hope of avoiding disease and for protection against rebellion and civil commotion.

### Contemporary problems

The region's major cities changed yet again after independence as they took on the role of regional and national centers for economic and industrial expansion. These changes are reflected in the urban landscape with the presence of westernized central business districts (CBDs) and industrial estates.





**Himalayan capital** (left) The center of Kathmandu in Nepal is a maze of narrow streets; the tall houses have elaborately carved wooden balconies. Although it appears to be remote from the 20th century, the city is being subjected to modernizing forces. During the 1960s it attracted the world's hippies, and it is a popular destination for tourists.

The city's growth has been rapid and chaotic, bringing with it many problems. A lack of financial resources has restricted investment in housing and in a modern urban infrastructure. Employment opportunities have also been limited by the lack of growth in services, and the demand for jobs far outweighs supply. The squatter settlements and shanty towns that have

sprung up across the region, in Kathmandu, Colombo, Dhaka, Lahore and Karachi as well as Bombay, Calcutta and Madras, have become symbols of poverty and squalor – home to millions of people who live in insanitary conditions that pose a constant threat to their health.

The region has a long history of urban planning – from the ancient Indus valley

5,000 people migrate to Bombay every week. Most of these come from the Western Ghats in western India, where rural poverty is endemic.

Many will end up in the *bustees* that surround Mahim Creek and the city's international airport. Over 1 million people are crammed into these slums at a density of more than 50,000 per sq km (130,000 per sq mi). The bustees are the world's largest shanty town. The appalling conditions are tolerated because the area provides a solution to a housing problem and is close to job opportunities in the nearby industrial complexes. The *bustees* are a city within a city – a symbol of human resourcefulness in adversity.



**The shelter of the streets** (above) Some of Bombay's millions of shanty-dwellers with their possessions all around them. The insanitary, crowded conditions of the slums and the problems of urban homelessness pose an enormous challenge to the subcontinent's politicians, administrators and planners – one that is likely to increase into the next century.

cities of Harappa and Mohenjo-Daro to the modern, post-independence cities of Chandigarh and Islamabad. It is however the problems associated with future urban growth that offer the greatest challenges to the skills of the subcontinent's planners, politicians and academics and will test the resourcefulness and tenacity of its urban populations.



# New Delhi

## — a triumph of architecture

European urban planning in India reached its zenith with the construction of the planned capital of New Delhi between 1911 and 1931. None of its architectural splendor, its imposing buildings and sweeping avenues, however, could halt the pace of India's march toward independence. The city, whose creation was announced with imperial flourish by King George V at his Coronation Durbar in 1911, acted as a British administrative capital for only 16 years. During that time it was a visual symbol of the authority, arrogance and power of the British Raj — but it was also its swan song.

### Delhi's historic site

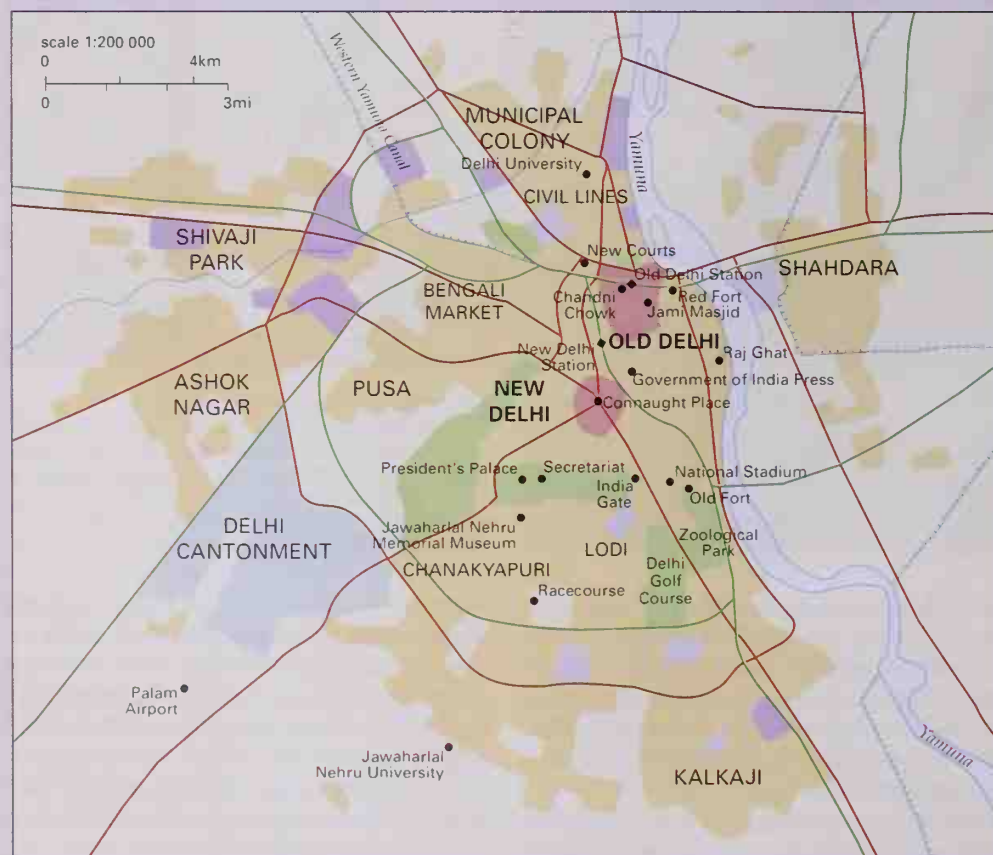
Long before the British arrived, Delhi's strategic position had made it the historic capital of India. Its position on the right bank of the Yamuna River, protected from the south and west by the Delhi Ridge, gave the city command over the fertile Indo-Gangetic plains. It was well situated to counter invading armies from the northwest frontiers of the subcontinent.

At least seven previous cities have occupied the site, dating back to the 1st century BC, and it is rich in historic



**Local color** (above) A dazzling array of market stalls can be found in the lanes of Old Delhi, where the Sadar and Chandni Chowk bazaars are among the city's largest. The irregular layout of Old Delhi betrays the fact that its streets were designed for pedestrian rather than vehicular traffic.

**Plan of two cities** (left) The imperial city of New Delhi was laid out beside the crowded old city, clustered around the Chandni Chowk and Red Fort (Lal Qila). The focal points of Lutyens' design were the Viceroy's House (now the President's Palace) and Connaught Place, an elegant ring of colonnaded shops and offices that is now being replaced by skyscrapers.







**Seat of government** At the center of Lutyens' city, Rajpath (previously Kingsway) leads up through the India Gate to the President's Palace. To one side is the parliament building, the Sansad Bhavan. Government offices flank the wide, tree-lined avenue.

monuments. In the 17th century the Mogul emperor Shah Jahan (1592–1666) built a great walled city, Shahjahanabad, to replace his existing capital at Agra. The most magnificent buildings of his city, the Lal Qila (Red Fort) and the Jami Masjid mosque, survive intact to this day. The area around them is a fine example of traditional Indian urban landscape, with a dense network of streets and courtyards centered on the Chandni Chowk, the main bazaar.

Delhi declined with the collapse of Mogul power, but in 1911 the British decided to move their capital there from Calcutta, which was becoming the center of the growing independence movement. A "New Delhi" was to be built to the south of the existing city, which at the time contained nearly quarter of a million people crammed into a squalid area of only about 4 sq km (1.5 sq mi).

The resulting city, designed by the architect Edwin Lutyens (1869–1944) with the help of Herbert Baker (1862–1946), took 20 years to complete. Its precise geometric layout is based on a series of wide tree-lined avenues radiating out from imposing buildings such as the Secretariat and the Viceroy's House, and from Connaught Place, a westernized shopping center. Many parks and memorials were incorporated into the city plan. The residential areas of the city reflected the complex hierarchy of rank, class and race that was present in the British imperial system. Military cantonments and civil lines were built to house the military and other officers of the colonial government.

Independence in 1947 brought a great influx of refugees to the city. Since then the population has soared – from 700,000 before independence to 5.7 million in 1991. A further 4 million live in the greater urban area. New Delhi continues to be the functioning center of India's power and government, but its phenomenal rate of expansion makes it a symbol of another kind. Its deteriorating infrastructure, environmental decay and growing squatter settlements testify to the severity of the problems and strains that rapid urbanization has brought to all the cities of the subcontinent.



# GOVERNMENT

NEW STATES IN SOUTH ASIA · DILEMMAS OF DEMOCRACY · BETWEEN EAST AND WEST

The fertile plains of the Indian subcontinent have attracted successive waves of conquerors since Neolithic times. In the 18th century the 200-year-old Muslim (Mogul) empire, which at its height extended eastward to Bengal and southward to the Deccan, fragmented at the same time as European trading companies began to expand into the region. By the mid-19th century nearly all the subcontinent, except the kingdoms of Bhutan and Nepal, was under British rule. The nationalist Congress movement led the struggle for India's independence, which was won in 1947, when the state of Pakistan was also created. In 1971 East Pakistan seceded as the new state of Bangladesh after a civil war. The islands of Sri Lanka and the Maldives, both former British colonies, achieved their independence in 1948 and 1965.

## COUNTRIES IN THE REGION

Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

**Island territories** Andaman Islands, Nicobar Islands, Lakshadweep (India)

**Disputed borders** India/Bangladesh, India/China, India/Pakistan, Pakistan/Afghanistan

## STYLES OF GOVERNMENT

**Republics** Bangladesh, India, Maldives, Pakistan, Sri Lanka

**Monarchies** Bhutan, Nepal

**Federal states** India, Pakistan

**Multi-party states** Bangladesh, India, Nepal, Pakistan, Sri Lanka

**States without parties** Bhutan, Maldives

**One-chamber assembly** Bangladesh, Bhutan, Maldives, Nepal, Sri Lanka

**Two-chamber assembly** India, Pakistan

## CONFLICTS (since 1945)

**Nationalist movements** India (Sikhs in Punjab, Muslims in Jammu and Kashmir, Tamils in Tamil Nadu), Sri Lanka (Tamils)

**Internal unrest** Bhutan 1990; India 1945-47, 1971, 1984, 1990, 1991, 1992; Sri Lanka 1956-59, 1976

**Coups** Bangladesh 1975, 1982; Maldives 1968; Pakistan 1958, 1969, 1977

**Civil wars** Pakistan (with Indian involvement) 1971; Sri Lanka (with Indian involvement) 1983-

**Interstate conflicts** India/Pakistan 1947-48, 1965, 1971; India/China 1962; India/Nepal 1989

## MEMBERSHIP OF INTERNATIONAL ORGANIZATIONS

**Colombo Plan** Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

**South Asia Regional Cooperation Committee (SARC)** All countries of the region

## NEW STATES IN SOUTH ASIA

The steps by which Britain granted independence to India and Pakistan were taken in the aftermath of World War II; few states can have been created amid such political turmoil. Despite the claim of the nationalist Congress Party, led by Mohandas Gandhi (1869-1948) and Jawaharlal Nehru (1889-1961), to represent all Indians, it failed to unite Hindus and Muslims. The Muslim League under the leadership of Muhammad Ali Jinnah (1876-1948) became the main representative of India's minority Muslim population, heading demands for the creation of a separate Muslim state of Pakistan.

### "Two nations" in India

Elections were held in 1946 as the first step toward self-government. These confirmed the existence of "two nations" in India: the Muslim League made a clean sweep of seats in all the Muslim areas, and Congress won most of the remainder. British proposals for an independent

India as a loose federation of states floundered, as riots and massacres in Calcutta in August 1946 led to intense communal strife. The result was partition as the two independent states of India and Pakistan.

The areas chiefly inhabited by the Muslim population lay in the northwest of the subcontinent and in eastern Bengal. These became the provinces of West and East Pakistan, separated by 1,600 km (1,000 mi) of territory lying in India. The movement of refugees was enormous as over 12 million people, both Hindu and Muslim, found themselves on the wrong side of the new boundary; the partitioning of Bengal and Punjab claimed half a million lives in each. The new states went to war over Kashmir; the 1949 ceasefire line still remains the northern boundary between them.

The new state of India - which declared

**New states in the making** Border disputes were at first frequent between the newly independent states of the subcontinent, continuing the religious and ethnic divisions that had brought about their partition. More recently, cooperation within the region has grown.







**A tragic dynasty** Rajiv Gandhi performs the funeral rites for his mother, Indira Gandhi, killed by Sikh militants in 1984. Following her as India's prime minister, he was himself assassinated in 1991.

**The trauma of partition** Refugees shelter in a mosque from Hindu violence. In order to end the massacres Gandhi – himself a Hindu – began a protest fast in January 1948: he was murdered by a Hindu extremist.



itself a federal republic in 1950 – was made up of a chaotic mosaic of political territories inherited from the British administration. Some 14 major languages are spoken by 90 percent of the population (in India there are 1,652 “mother tongues”). It was feared that the creation of states based on linguistic divisions would endanger national unity, and in

1950 a federal constitution came into being that instead divided India into 27 “administrative” states.

These arrangements did not work. In 1952 the Telugu-speaking state of Andhra Pradesh was formed, and in 1956 the political map was redrawn to produce 14 language-based states. The government was forced to abandon its plans to make Hindi the sole language used at national level. Further states were created in the next few years. Goa was annexed from Portugal in 1961 following a short war. Sikkim was persuaded to join the federation in 1975, the last of the princely states to do so. There are now 25 states in the republic, as well as seven union territories under federal administration.

#### Challenges to national cohesion

In the early 1990s, increasing violence between Hindus and Muslims throughout India appeared to threaten the ideal of nonsectarianism on which the modern state of India was founded. There were other challenges to national cohesion. The Sikhs of the Punjab have never ceased to agitate for a separate homeland (Khalistan). In Jammu and Kashmir mounting violence between Muslim separatists and the Indian army led to the imposition of central rule in 1990. Tamil nationalists in

the south found common cause with the Tamils in Sri Lanka.

In Pakistan the death of Jinnah in 1948, only a year after independence, removed from the political scene possibly the only figure capable of giving national cohesion to the two separate territories of West and East Pakistan. Increasing demands for self-government from East Pakistan led to the imposition of military rule in 1958. The country's first direct popular elections were held in 1970. The Awami League, campaigning for increased regional self-government, won 167 of the 169 seats in East Pakistan, giving it an overall majority in the national assembly. The upshot was civil war: East Pakistan seceded as the state of Bangladesh.

Separatist demands in Sri Lanka from the Hindu Tamils (about 20 percent of the population, many of Indian origin) took increasingly violent form in the early 1980s, leading to a civil war that cost thousands of lives. A peace pact signed by the Sri Lankan president Junius Jayawardene and India's prime minister Rajiv Gandhi in 1987 proposed the creation of a Tamil-run province in the north-east of the island, but the Tamil Tigers, the strongest and most violent of the guerrilla groups, continued to press for complete independence.



## DILEMMAS OF DEMOCRACY

The states of South Asia are governed in a variety of ways. The Maldives are without political parties. Executive power is held by an elected president, and there is a 48-member parliament (*majlis*). Political parties are also unrecognized in the Himalayan kingdom of Bhutan, where the king rules as an absolute monarch. Its neighbor Nepal has been a constitutional monarchy since 1990. On independence, the states of the subcontinent formerly under British rule all adopted constitutions that embody some form of parliamentary democracy. They have been sustained ever since with varying degrees of success.

**Vulnerable democracies**

Both Bangladesh and Pakistan have experienced long episodes of military rule. Pakistan's first coup, in 1958, was led by an army general, Mohammad Ayub Khan (1907–74), who became president in 1960. He was deposed in 1969 by General Yahya Khan, whose decision to allow popular elections in 1970 led to the civil war that resulted in East Pakistan's secession as Bangladesh.

Civilian rule returned in 1971 under Zulfikar Ali Bhutto (1928–79), but the victory of his Pakistan People's Party in the 1977 elections was disputed amid widespread accusations of malpractice. Riots ensued, and martial law was then imposed under General Mohammad Zia ul-Haq (1924–88). Bhutto was executed in 1979. In 1986 political parties were allowed to operate again, and Bhutto's daughter, Benazir Bhutto, returned from exile to

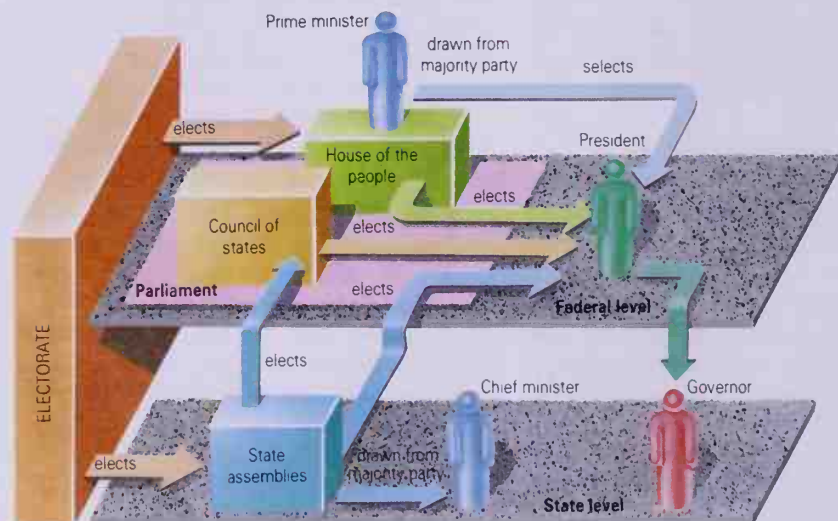
head the People's Party. Zia was killed in an air crash in 1988, and in elections later in the year Benazir Bhutto was elected prime minister but in 1990 was removed by the president in a "constitutional coup". She lost the ensuing elections.

In Bangladesh, martial law was imposed between 1975 and 1979, and again between 1982 and 1986. The military, with General Hussain Mohammad Ershad as president, remained in control, but in 1990 Ershad was forced to resign after antigovernment riots. Parliamentary government was restored in 1991 with the holding of national elections.

Sri Lanka's style of government is based on the Western competitive multi-party model. Electoral support has been mostly divided between two main parties – the United Nationalist Party (UNP) and the Sri Lanka Freedom Party (SLFP), which is socialist and more narrowly Sinhalese in appeal. In 1972 the SLFP,

**Voting in an Indian election** India has a large number of political parties. Because of widespread illiteracy among voters a clearly recognizable symbol is allocated to each one, which appears next to the candidate's name on the ballot paper. These symbols have great potency: Indira Gandhi's Congress Party was a cow and calf, implying care and protection.

**India's federal constitution** India is a federal republic: its 25 states are self-governing. Power is exercised at national level by the prime minister, who controls the Lok Sabha (House of the People) in the two-chamber federal parliament, elected every five years. The president is chosen by the federal and state parliaments: in practice the prime minister's nominee is always elected.



**A woman in a man's world** Benazir Bhutto became the first woman prime minister of an Islamic state in 1988, but was unable to withstand the strength of traditionalist opposition and was later dismissed.





led by Mrs Sirimavo Bandaranaike, introduced a new constitution: the name of the country was changed from Ceylon to Sri Lanka, and extended the life of parliament to six years. The UNP, which came to power in 1977, adopted a presidential form of government a year later. It enjoyed uninterrupted power throughout the 1980s and early 1990s, while the issue of Tamil separatism, which came to dominate Sri Lankan politics, led in 1983 to the declaration of a state of emergency.

#### The largest democracy in the world

Perhaps the most notable thing about India's democratic system is its sheer size: in a country that has the second largest population in the world, it takes some 2 million officials to run a national election to the federal parliament. The Congress Party, heir to the nationalist independence movement, dominated national politics; no major party challenged

#### COMMUNAL STRIFE IN SRI LANKA

The dispute in Sri Lanka between the minority Tamils and the majority Sinhalese first surfaced in political conflict over language policy in the newly independent state. The decision of the SLFP government led by Solomon Bandaranaike to establish Sinhalese rather than English as the official language precipitated Tamil riots, and in 1959 the prime minister was assassinated by a Buddhist monk.

The SLFP government that was led by his widow, Sirimavo Bandaranaike, between 1970 and 1977 introduced pro-Sinhalese policies in education and employment. These exacerbated Tamil complaints of discrimination, and in 1976 the Tamil United Liberation Front (TULF) was formed to campaign for a separate Tamil state (Eelam) in the north and east of Sri Lanka. It emerged as the main opposition party to the

victorious UNP in the 1977 elections, the same year that renewed communal violence broke out.

The existence of a Tamil state (Tamil Nadu) in southern India complicated matters. The Indian government became increasingly worried that Tamil unrest would spread there from Sri Lanka. In 1987, the Sri Lankan government agreed to allow Indian troops into the Jaffna peninsula, the stronghold of the Tamil Tiger guerrillas, to disarm the rebels in return for substantial concessions, including the creation of a Tamil province. The Tamil Tigers, however, refused to observe a ceasefire. The negotiations for India's withdrawal were protracted, and the last troops did not leave until 1991. The violence continued, and in March 1991 more than 2,500 Tamil Tigers were killed by Sri Lankan troops.



its rule for 20 years, though numerous small and regionally based political parties contested power in state elections.

The period of one-party dominance ended abruptly in 1967 when Congress lost control of eight state governments, initiating a period of instability and confusion. The landslide victory of the Congress Party of Indira Gandhi (1917–84) in 1971 appeared to bring a return to normality. However, severe economic problems created a sense of national crisis, and it was in this atmosphere that Mrs Gandhi was found guilty of "corrupt electoral practices". Rather than face disqualification from politics, she declared a state of emergency: political opponents were imprisoned and the press censored.

After restrictions had been lifted, four opposition parties united to form the Janata Party to contest elections in 1977. Congress was heavily defeated, but returned to power in 1980. In 1984, in the aftermath of the assassination of Indira Gandhi, it won overwhelmingly, and her son Rajiv (1944–91) succeeded as prime minister. However, the party lost its ruling majority in 1989. The election campaign of 1991 was thrown into disarray by the assassination of Rajiv Gandhi by Tamil nationalists. The rise of the sectarian Hindu party Bharatiya Janata Party (BJP) provoked rioting throughout the campaign, but Congress was able to form the government, led by P. V. Narasimha Rao, on a minority vote.





## BETWEEN EAST AND WEST

The independent states of the Indian subcontinent were among the first to be created in the breakup of Europe's colonial empires after World War II, which brought far-reaching changes in world politics. India found itself much the largest independent state in what would later be known as the Third World, and was strongly placed to exercise influence in the worldwide movement against colonial power.

Independence coincided with the growth of the Cold War, a period of heightened hostility between the new global superpowers of the Soviet Union and the United States. By choosing not to place itself in one camp or the other, India played a significant part in bringing a new force, the nonaligned movement, to bear in world politics.

### Nehru's foreign policy

The architect of these achievements was India's first prime minister, Jawaharlal Nehru. He won wide respect for his moral approach to international relations, which



rejected the setting up of aggressive "defense" pacts as the means of solving world problems, and sought to find positive ways to achieve peace between nations. He was hailed as a peacemaker for his part in bringing an end to the Korean war (1953). Nehru undertook numerous major foreign policy trips during his premiership, including visits to China, the Soviet Union and the United States; the number of visits that world leaders paid to New Delhi in these years

is an indication of his unique position as international statesman.

Nonetheless, the realities of India's foreign policy were often at variance with its stated intentions. Disputes over boundaries and other issues of national security were many in a region in which states had been founded in conditions of civil war to preserve religious and ethnic differences. In the case of India and Pakistan there was armed conflict on three occasions: 1947, 1965 and 1971, when Indian

**A dominant power in South Asia** Military hardware is paraded through New Delhi on Republic Day (26 January). Estimates suggest that up to 70 percent of India's military equipment in the 1980s was supplied by the Soviet Union.

**Nehru on the world stage** Soviet leader Nikita Khrushchev greets Nehru on one of his visits to Moscow. In 1955 he was the first noncommunist world leader to address a Soviet audience: 100,000 people heard him speak in the Dynamo Stadium. In the Cold War atmosphere of the 1950s Nehru refused to side with either superpower, or let India be dominated by them.



## NEHRU AND NONALIGNMENT

The nonaligned movement began in the 1950s and 1960s as a collaborative effort by newly independent Asian and African states to create an alternative voice in world politics that was free of dependence on the dominant Western and Eastern blocs. The term was originally coined by Nehru. A conference of African and Asian countries held in Bandung, Indonesia in 1955 laid down the principles later adopted by the nonaligned movement: the condemnation of colonialism throughout the world, and the promotion of peaceful coexistence and of international cooperation through the strengthening of the United Nations.

It was the work of three men – Nehru, President Josip Tito of Yugoslavia (1892–1980) and President Gamal Abdel Nasser of Egypt (1918–70) – that led to

the first conference of nonaligned states at Belgrade in Yugoslavia in 1961. Attended by representatives from 27 states, its concluding declaration made clear the movement's opposition to blocs of any kind, economic or political. It condemned action that inhibited the independence of individual states, including the maintenance of military bases in another state's territory, and the pursuit of racist policies.

The next conference was held in Cairo, Egypt in 1964 and was attended by 47 states, with 11 more coming as observers. As the movement grew in size, regional concerns tended to cut across global policies; increasing attention was given to economic conditions in the Third World as one of the few areas in which common agreement for action could be found.

troops invaded East Pakistan in support of the separatist movement there and then remained to oversee the creation of the independent state of Bangladesh. Tension between India and Pakistan over Kashmir was renewed in 1989. Despite the signing of a nonaggression agreement between India and China in 1954, border disputes along the border with Tibet (under Chinese control since 1951) erupted into fullscale war in 1962.

The three states that separate India and China along the Himalayan border lie in what India considers to be its sphere of influence. The largest, Nepal, has been able to assert most independence. The formation of closer ties with China (including the purchase of arms and the completion of a Chinese-built road link) led India in 1989 to impose a trade blockade ostensibly to control smuggling. India maintains an advisory role over Bhutan's foreign policy. Sikkim, the smallest of the states, was incorporated into the Indian state in 1975.

### The quest for regional parity

In the early years after independence Pakistan, much the weaker in terms of population and resources, responded to India's growing dominance in the region with a pro-Western foreign policy. In sharp contrast to India's nonalignment

**Food is distributed** to new arrivals at an Afghanistan refugee camp at Nasirbagh in Pakistan. More than 3 million people fled across the border after the Soviet invasion of Afghanistan in 1979

Maldives to restore order after an attempted coup. Both India and Pakistan are believed to have limited nuclear capability, though in Pakistan's case this has always been denied.

Under Zia ul-Haq, Pakistan in the late 1970s saw its role lying toward the Islamic world. At the same time it received massive aid from the United States, which aimed to build up its strategic position in the Gulf and Indian Ocean. After 1979 this aid was channeled to the Islamic Mujahidin guerrillas fighting the Soviet occupation of Afghanistan. In 1989 Pakistan rejoined the Commonwealth, which it had left in 1972 following the decision of other Commonwealth members to recognize the independent state of Bangladesh.

Since independence, Bangladesh has had minor border disputes with India, as well as continuing differences over the sharing of the waters of the River Ganges; the annual influx of Bangladeshi refugees into Assam and West Bengal continues to damage relations. Nonetheless, Bangladesh's major contribution to the future development of South Asia was the establishment of the South Asian Regional Cooperation organization (SARC), which was proposed by General Zia ur-Rahman in 1980. The agreement signed by all seven states in the region at its inaugural meeting at Dhaka in 1985 pledged cooperation in combating terrorism and drug trafficking, and launched ten co-operative programs in agriculture, telecommunications and transport.





# Bangladesh: the birth of a nation

The partitioning of Bengal, in the north-east of the subcontinent, in 1947 left the western part of the province in India; the eastern, predominantly Muslim part joined the new state of Pakistan. Pakistan's unique arrangement of two constituent but geographically separate provinces set a severe challenge to national integration, which the government failed to meet.

The relationship between the two parts was always unbalanced. East Pakistan had the greater population, but the center of civil and military government was in West Pakistan. Although most of Pakistan's export earnings came from jute produced in the East, investment was concentrated in the West.

These economic grievances were compounded by the second Indo-Pakistan war in 1965. East Pakistan was cut off from the West within an hour of the war starting, and none of Pakistan's forces were assigned to defend it. In the event India did not fight on the eastern front, but the lesson was clear for all to see: at a time of national emergency East Pakistan, and therefore the majority of Pakistan's population, was expendable.

Given this background of resentment, it was not surprising that in Pakistan's first popular elections in 1970 the Awami League, which fought its campaign on the need to renegotiate the federal constitution and curtail the power of central government, won an overwhelming victory in East Pakistan. As the more populous province, it had a majority of seats in the national assembly. However, talks on rewriting the constitution soon broke down.

For a short period in March 1971 Sheikh Mujib ur-Rahman, as head of the Awami League, was in effect leader of a separate state in East Pakistan, to which the Pakistani president was invited as a "guest" for discussions on the crisis. Then the Pakistani army struck. Mujib was arrested and sentenced to death, and East Pakistan placed under military control.

Secession followed. Declaring itself the state of Bangladesh ("Bengal nation"), a government in exile was set up in Calcutta, from which resistance to Pakistani rule was organized. Administration broke down completely. The flight of 10 million refugees to India resulted in the Indian army's intervention in the nine-month civil war. In two weeks the Pakistan army was defeated, and on 16 December 1971 Indian troops entered Dhaka, the provin-



**Taking to the streets** A protest group in Dhaka in December 1971 demands an end to the Indian government's intervention in Pakistan's affairs. Within days the Indian army had launched its blitzkrieg attack against East Pakistan, to enter Dhaka on 16 December.

**Concrete pipe dreams** Thousands of the 10 million refugees who fled to India from East Pakistan find shelter in a temporary city of concrete pipes outside Calcutta. Their plight forced the Indian government to take action to end Pakistan's civil war.

cial capital. The new state of Bangladesh was proclaimed and rapidly gained international recognition.

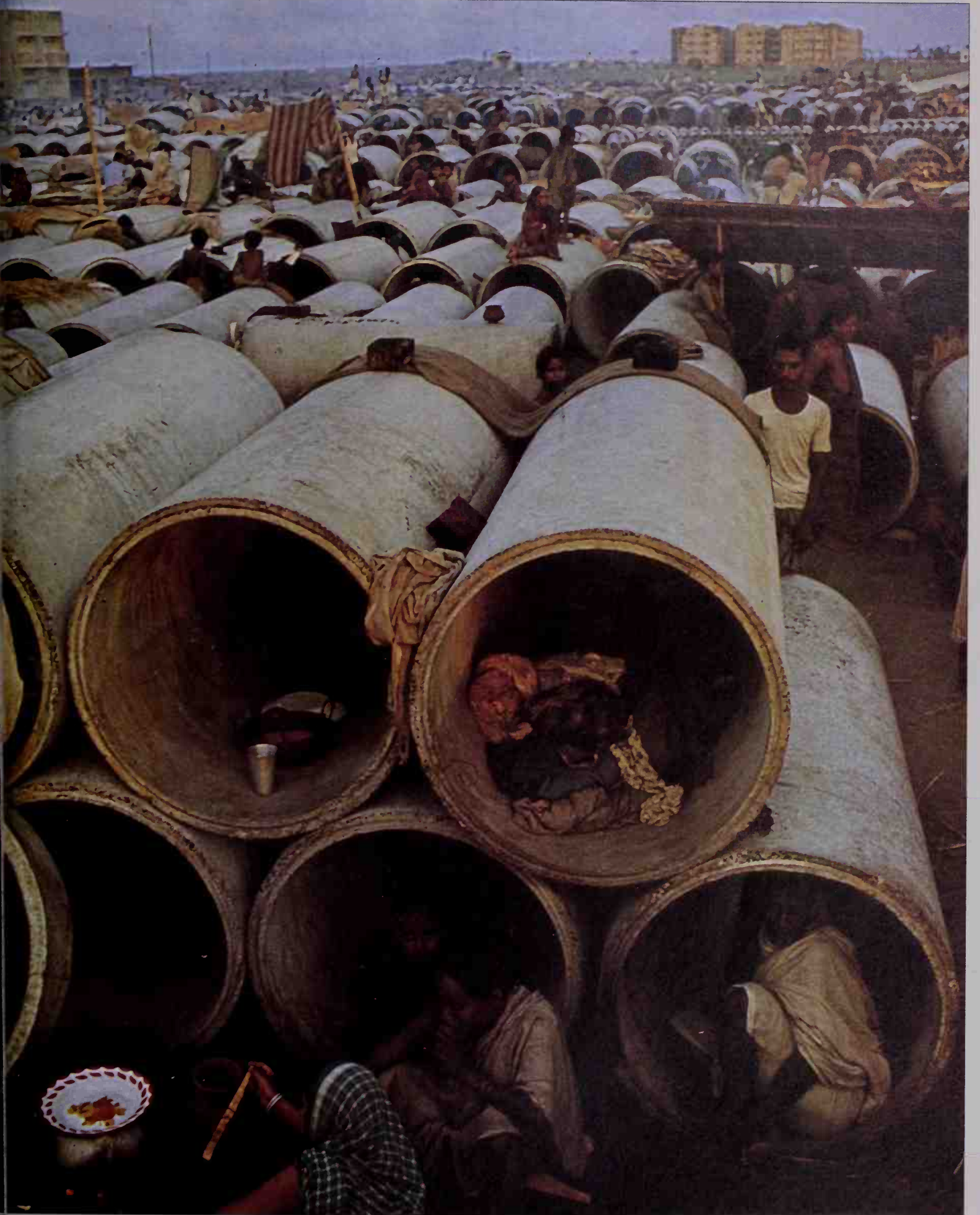
## Building the new state

Despite the devastation of the civil war, and with the world's eighth largest population, Bangladesh embarked upon its independent life with high hopes. Mujib became prime minister in a parliamentary government, and the task of reconstruction began. The optimism did not last. Within three years a state of emergency was declared, and Mujib became president of a one-party state. Months later he was assassinated. Severe economic problems prevented any subsequent government from maintaining any degree of popular support. One other president (General Zia ur-Rahman) was assassinated in 1981, and martial law has been imposed on more than one occasion.

Bangladesh has enjoyed considerable success in foreign affairs. In 1978 it was elected to the Security Council of the United Nations, in preference to Japan, and succeeded to the presidency of the council one year later. It is a member of the Commonwealth, the Islamic Conference, and the nonaligned movement.

However, while participating fully in the world community of states, in the face of frequent flood and famine Bangladesh has not been able to overcome the enormous problem of providing a decent minimum standard of living to the majority of its people. It is a major recipient of international aid. In these circumstances the army acted as the guarantor of law and order. However, the resignation of General Ershad as president in 1990, and the restoration of elections, gave the hope that Bangladesh was moving toward a more democratic future.





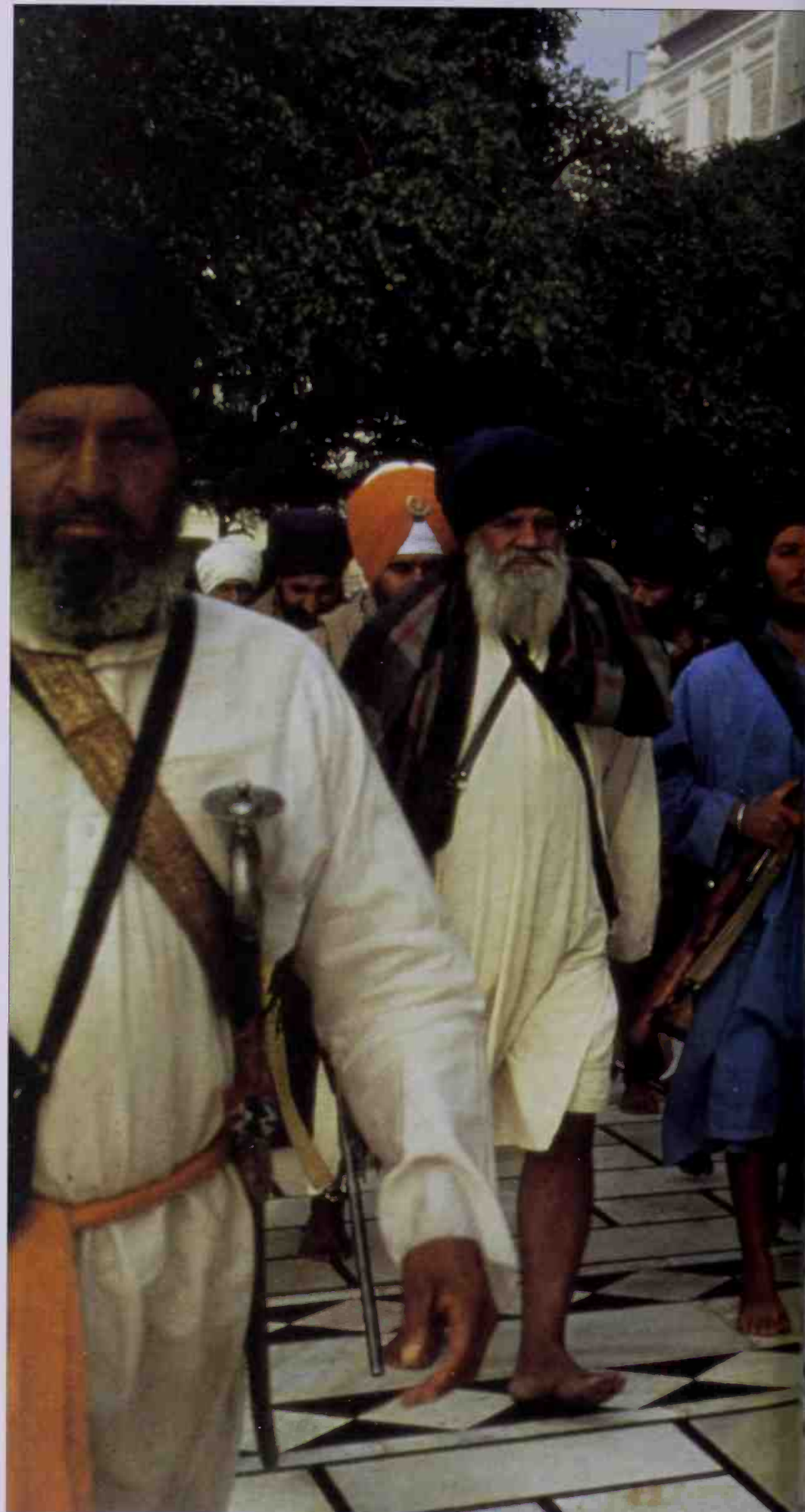


## Assault on the Golden Temple

The Golden Temple at Amritsar is the center of the Sikh religion and its most revered shrine. In 1984, after 298 people had been killed during a period of communal violence between Sikhs and Hindus, the Sikh fundamentalist Jarnail Singh Bhindranwale turned his headquarters in the Golden Temple into an armory for Sikh militants.

On the night of 5–6 June, in Operation Bluestar, the Indian army carried out an assault on the Golden Temple with simultaneous actions on 45 other Sikh shrines. A bloody three-day siege ensued: it ended with 576 dead, including Bhindranwale. In the aftermath of the battle the call for an independent Sikh state, Khalistan, gained ground. In July and August Sikh gunmen hijacked two Indian airliners. The army returned control of the temple to five head priests in September, but this did not overcome the sense of sacrilege that was felt by many Sikhs.

On 31 October two of prime minister Indira Gandhi's Sikh bodyguards shot her down as she walked from her home to an adjacent office. Twenty-one bullets were found in her body. New Delhi experienced its greatest violence since partition, with some 2,700 killed in communal clashes. Rajiv Gandhi succeeded his mother immediately, but no solution to the Punjab problem was found. The Sikh community continued to be disrupted by the terrorist activities of Sikh extremists, which the Indian government was unable to suppress.



**Armed Sikhs** within the Golden Temple, or Harimandir, the holiest shrine of the Sikh religion, founded in the 15th century.







# ENVIRONMENTAL ISSUES

A LANDSCAPE CARVED FOR USE · DEFORESTATION AND POLLUTION · DEFENDING THE LAND

The Indian subcontinent is prone to natural disasters on a grand scale – cyclones, flooding and drought – and is beset by environmental problems, many stemming from rapid population growth. However, its peoples are resilient, responding in positive ways to the challenges that face them. For example, in the Himalayas, extensive deforestation by loggers inspired villagers to defend their trees by “hugging” them, a move that initiated a powerful conservation movement. The problems are diverse. On the arable lands of Pakistan and India intensive agriculture has led to waterlogging and salinization from over-irrigation. Other critical issues include high levels of industrial and sewage pollution in the region’s overcrowded cities, in the rivers and along the coastline, and the associated health risks to the population.

## A LANDSCAPE CARVED FOR USE

For over 5,000 years, people have dramatically modified the environments of the Indian subcontinent by cutting down the forests and constructing terraces and complex irrigation systems. Behind many of the changes lay the need to control water supply, both for domestic needs and for agriculture (the chief economic activity) in a region frequently struck by drought and flooding. As early as 2500 BC, the two great cities of Mohenjo Daro and Harappa – products of the lower Indus valley civilization in present-day Pakistan – were reliant for their barley and wheat crops on the fertile floodplain and waters of the Indus river.

Patchworks of irrigated agricultural plots dominate the landscape of the lower Indus plains in Pakistan’s Sind province, and paddyfields cover the floodplains of the Ganges and Brahmaputra rivers in northeastern India and Bangladesh. In mountainous Nepal and Bhutan, in the Himalayan states of India, and on the

hills of Sri Lanka, steeply banked rice-growing terraces have been carved out of the slopes, irrigated with rainwater runoff. The landscape of the drier parts of India, such as the southern state of Tamil Nadu, is covered with earthen “tanks”, constructed to store the sparse rainfall.

The subcontinent’s landscapes and economic structures – particularly those of India – changed significantly during the period of British colonial rule (1858 to 1947). The British invested heavily in irrigation canals, enabling extensive areas to be brought under cultivation for the first time. They encouraged tea growing, so that by 1871 India had over 300 tea plantations covering 12,000 ha (30,000 acres). They also helped develop modern industry – for example setting up the cotton mills of Bombay. In the 1850s the British began laying out the railroad networks of what were to become India and Pakistan, opening up the region’s vast reserves of coal and rich iron-ore deposits for exploitation, and enabling agricultural produce to be transported from the interior to the ports of Bombay, Calcutta and Madras for export.

### COUNTRIES IN THE REGION

Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

### POPULATION AND WEALTH

	Highest	Middle	Lowest
<b>Population</b> (millions)	853.1 (India)	19.1 (Nepal)	0.2 (Maldives)
<b>Population increase</b> (annual population growth rate, % 1960–90)	3.0 (Pakistan)	2.4 (Nepal)	1.9 (Sri Lanka)
<b>Energy use</b> (gigajoules/person)	8 (India)	2 (Bangladesh)	1 (Nepal)
<b>Real purchasing power</b> (US\$ person)	2,120 (Sri Lanka)	870 (Nepal)	720 (Bangladesh)

### ENVIRONMENTAL INDICATORS

<b>CO<sub>2</sub> emissions</b> (million tonnes carbon/annum)	230 (India)	6.8 (Nepal)	0.2 (Bhutan)
<b>Deforestation</b> (’000s ha/annum 1980s)	1,500 (India)	58 (Sri Lanka)	1 (Bhutan)
<b>Artificial fertilizer use</b> (kg/ha/annum)	113 (Sri Lanka)	77 (Bangladesh)	1 (Bhutan)
<b>Automobiles</b> (per 1,000 population)	7 (Sri Lanka)	2 (India)	0.4 (Bangladesh)
<b>Access to safe drinking water</b> (% population)	57 (India)	41 (Sri Lanka)	36 (Nepal)

### MAJOR ENVIRONMENTAL PROBLEMS AND SOURCES

**Air pollution:** generally high, urban very high; acid rain prevalent; high greenhouse gas emissions  
**River pollution:** medium, *sources:* agricultural, sewage  
**Land degradation:** types: desertification, soil erosion, salinization, deforestation, habitat destruction, *causes:* agriculture, industry, population pressure  
**Resource problems:** fuelwood shortage, inadequate drinking water and sanitation, coastal flooding  
**Population problems:** population explosion, urban overcrowding, inadequate health facilities, famine  
**Major events:** Bhopal (1984), leak of poisonous chemicals; Bangladesh (1988, 1991), major floods







### The drawbacks of development

In postcolonial times, the rise of industry and intensive agriculture has been paralleled by a massive increase in population. Bangladesh's population more than doubled in the 30 years from 1960 to 1990, taking it from 51.6 million to 116 million. India's increased by more than 50 percent over the same period, from 555 million to 853 million, and the region now has some of the most overcrowded and rapidly expanding cities in the world, where squatter encampments are common, and essential services – such as clean water supplies and sanitation facilities – are often completely lacking.

In rural areas, too, largescale modifications have been made to the environment

**Struggling to cross the mountains**, a bus tries to pass a rockfall on the Karakoram Highway between Pakistan and China. Earthquakes are frequent in the northern mountains of the region and present a constant threat to roads, bridges and dams.

since the 1960s, many of which have been affected by environmental setbacks. In the mountains of Pakistan, for example, stretches of the Karakoram Highway, built in the 1970s to link Pakistan with China across the Karakoram Mountains, are constantly washed away by raging streams and huge floodwaves – generated by the collapse of natural landslide dams – or are blocked by rockfalls, some caused by the frequent earth tremors.

Large dam-building schemes have extended irrigation, increasing agricultural yields for the expanding population, but they have also caused extensive damage to local habitats, and in one instance created a major disaster. In 1967, five years after the completion of the Koyna Dam, south of Bombay, an earthquake – probably triggered by reservoir water seeping into the rocks – killed 200 people and left thousands homeless in an area previously free of earthquake activity.



## DEFORESTATION AND POLLUTION

Tropical forest once covered most of the Indian subcontinent, but today relatively little of it remains. Pressure for farmland in India has led to the destruction of more than 50,000 sq km (19,300 sq mi) by slash-and-burn cultivators. This once-sustainable system of agriculture has become a highly destructive use of land, leading to soil erosion and landslides on mountain slopes, and land degradation in lowland areas. By 1990 some 1.5 million ha (3.75 million acres) were being destroyed annually. Many of the forests that have survived largescale destruction by loggers and cultivators have been degraded by rural communities that depend on fuelwood for heating and cooking. Urban demand has increased the pressure; Delhi's firewood now comes from Madhya Pradesh, some 675 km (420 mi) away to the south, as local resources have been used up.

In Sri Lanka rainforest once covered the entire southwestern quarter of the island, but nearly all of it has now been cleared for rice and coconut plantations on the lowlands, and tea and teak on the hill-sides. Similarly, the mangroves, swamps and rainforests that covered much of Bangladesh have been almost totally destroyed by an expanding population that averages a staggering 800 people per sq km (2,000 per sq mi).

The problems of deforestation are not confined to the region's tropical forests. In Nepal, the wet hill forests, which support evergreen oaks and chestnuts, are fast diminishing. Over the last 25 years Nepal has lost 30 percent of its forest cover, mainly to local fuelwood collectors who gather wood both for their domestic needs, and to keep the growing number of tourists warm at night on their mountain treks. Three-quarters of the rural population of Pakistan also depend on fuelwood. But the greatest threat to the existing forests in this part of the region comes from livestock grazing – the most widespread form of land use.

The few areas of the region that are still densely forested are under serious threat. In the Bay of Bengal, the Andaman and Nicobar Islands are largely covered by rainforest and monsoon forest. However, population growth (partly due to an influx of emigrants from the Indian main-



**Draining away human effluent**, an open sewer and storm drain in Peshawar, northern Pakistan. Water quality throughout this highly populated country is deteriorating, with inadequate sewage facilities being a major contributor.

land), agricultural expansion (particularly of rice) and logging have put enormous pressure on surviving areas. Bhutan in the Himalayas has retained 53 percent of its forest cover, but here the greatest threat, particularly in the south, comes from cultivation of the spice cardamom.

### Price of a "Green Revolution"

In the mid 1960s the need to increase agricultural production in India, Pakistan and Bangladesh to feed the growing population led to the expansion of irrigated areas, and the introduction of new, high-yielding varieties of wheat and rice. This program of improvement launched

the so-called "Green Revolution". Food output in both Pakistan and India increased, but success was limited in Bangladesh, where the stems of the new rice variety proved too short for areas that were deeply flooded by seasonal rains.

A heavy price has been paid for the changeover from traditional farming techniques to intensive agriculture. In many areas, overirrigation has reduced the productivity of the land: India and Pakistan together have lost more than 17 million ha (42 million acres) of arable land because of waterlogging. Increased soil salinity from overirrigation and inadequate drainage has also degraded land. About one-third of Pakistan's irrigated land has been affected by salinization.

The indiscriminate use of chemical fertilizers and pesticides has brought further problems. Farmers spraying their fields





world. Sewage is perhaps the worst of the problems. Of India's 3,119 towns and cities, just eight are able to treat their sewage fully before discharging it into rivers and lakes. In Pakistan, only the modern capital Islamabad (founded in 1961) and Karachi on the coast have sewage-treatment plants (though the two plants in Karachi function only intermittently). The results are severe contamination of rivers and canals, which are frequently used for bathing, washing and

drinking. For example, the river Ravi near Lahore in Pakistan sometimes flows with as much sewage as water.

Industrial effluent is also discharged directly into rivers and the sea. Along the coast of Pakistan the major pollutant is oil, which comes from Karachi's oil terminals and also from slicks that drift across the Arabian Sea from the Gulf. These are sometimes so bad that the country's fishing industry is virtually brought to a halt.

### THE TRAGEDY OF BHOPAL

Just after midnight, on December 3 1984, a loud hissing sound was heard coming from the top of a tall smokestack at the American-owned Union Carbide pesticide plant in Bhopal, in northern India. The sound was caused by a leak of methyl isocyanate – a lethal chemical gas – that had been allowed to build up to very dangerous levels. Heavier than air, the cloud of gas sank from the smokestack and billowed out through the narrow streets of Bhopal's poorer districts. People awoke choking and vomiting, and often temporarily blinded. Many tried to flee in panic, but for others the gas proved fatal within minutes, leaving the streets strewn with bodies. By dawn, the chaos and carnage was so terrible that corpses

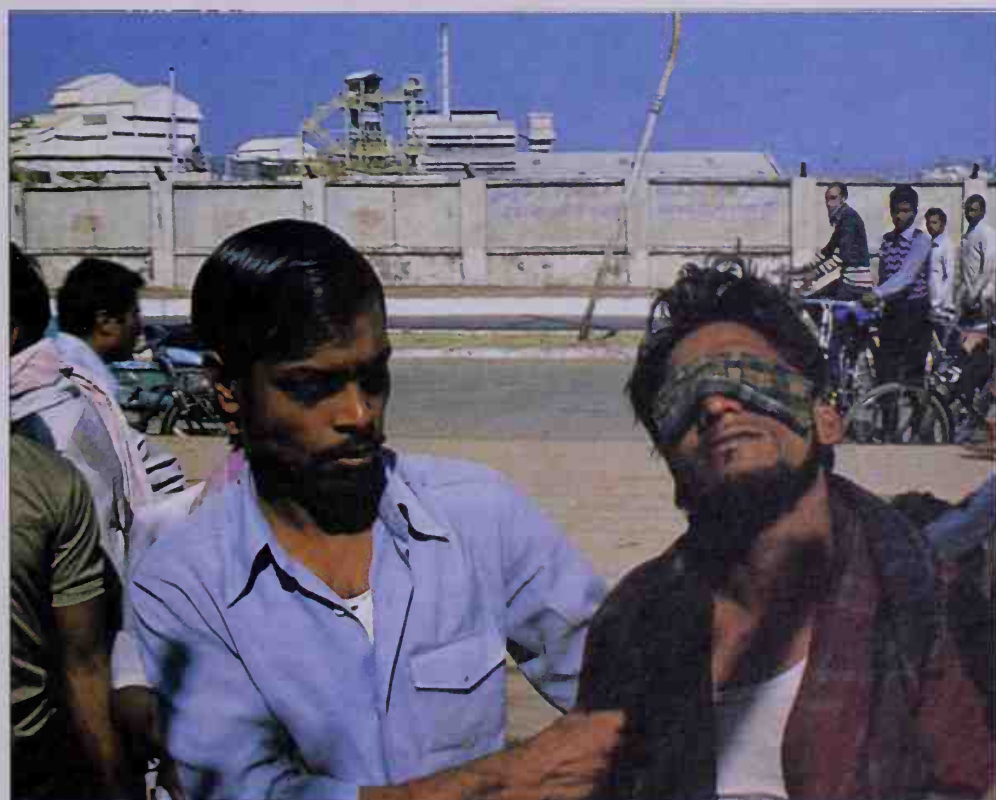
were simply heaped onto funeral pyres and cremated. Over 3,000 people died, some 30,000 were seriously injured, and perhaps 300,000 were affected with relatively minor ailments.

The prime cause of the catastrophe was an inadequate management that was lax about safety precautions. In addition, a plant of this type should never have been built so close to human settlement. Legal wrangling over responsibility and compensation (originally \$3 billion) has dragged on for years, and despite the "polluter pays" principle, few of the victims of Bhopal have received any compensation for their suffering. By 1991, seven years after the accident, the government had classified only 41 people as permanently disabled.

are often poisoned because they do not wear protective masks; and runoff from intensively used plots pollutes rivers and groundwater, from which drinking water is pumped directly in numerous villages. In addition, most agrochemicals have had to be imported, putting added strain on the region's developing economies.

#### Urban and water pollution

The combination of phenomenal urban growth – there are some 250 million urban dwellers in the region – and an almost complete absence of pollution control has led to some of the worst conditions of urban pollution and overcrowding in the



**A "lucky" victim**, just one of hundreds of thousands of people affected by the Bhopal disaster in December 1984, in which over 3,000 died. In all some 640,000 claims for compensation have been received so far by the Indian government.



## DEFENDING THE LAND

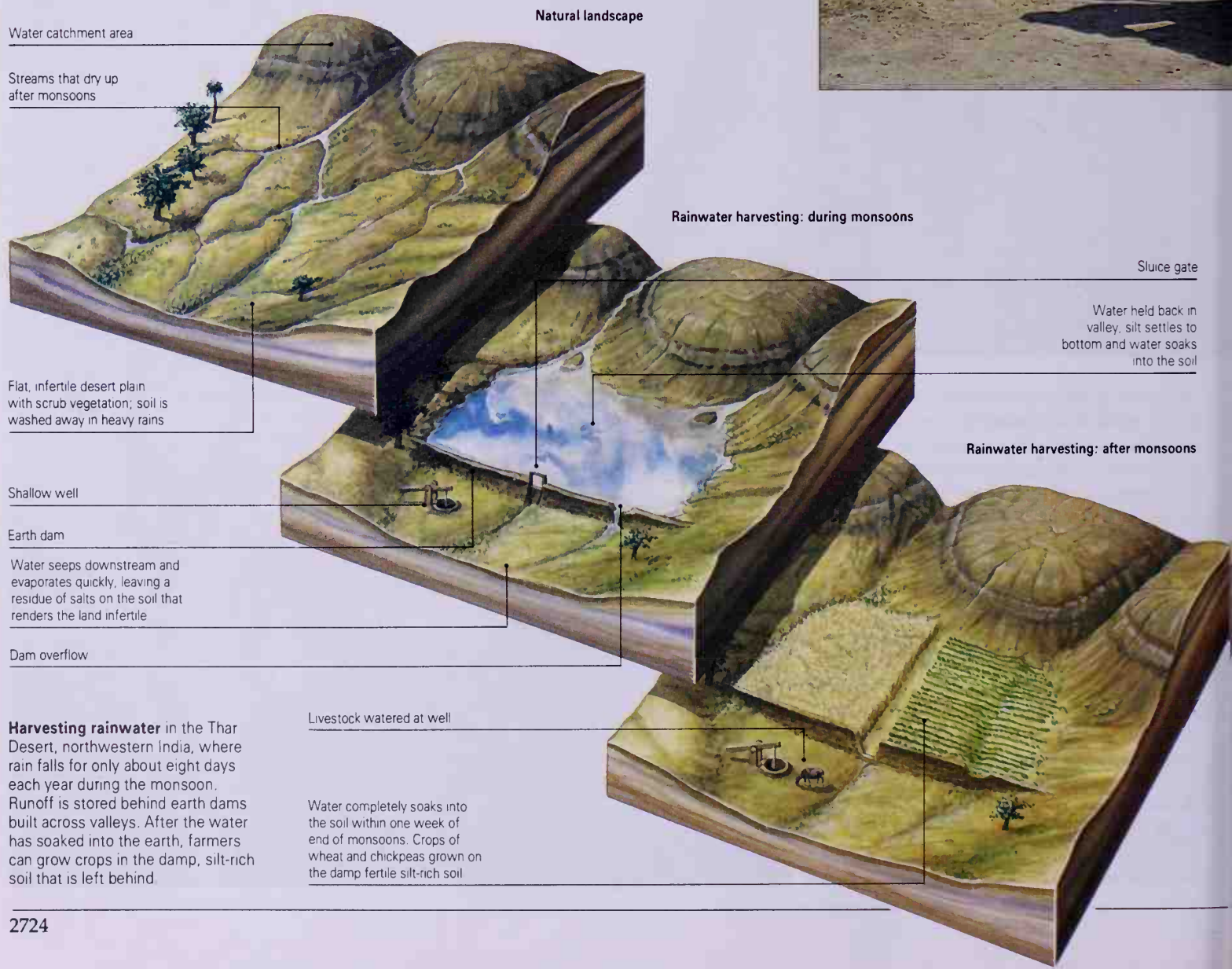
All over the Indian subcontinent, local people – often in conjunction with non-governmental organizations – have taken initiatives to combat environmental degradation. One of the most dramatic demonstrations of “people power” took place in 1973, when villagers from the remote village of Gopeshwar in Uttar Pradesh, close to India’s border with Tibet, confronted loggers who had come to cut timber for a sporting goods manufacturer. Determined to save the trees – their source of food, shelter, medicines and animal fodder – and unable to stop the loggers by persuasion, the villagers hit upon a strategy in keeping with the nonviolent philosophy of Mahatma Gandhi (1869–1948), India’s revered pre-Independence leader. They decided to

put their arms around the trees and protect them with their own bodies.

This action sparked off what is possibly the best-known Third World grass roots campaign, the Chipko Movement (*chipko* in Hindi meaning “to hug”). In response, the Indian government reviewed its policy regarding forests. Today, there is no commercial logging of forests in Uttar Pradesh, and in the area where the Chipko Movement began, villagers have undertaken extensive reforestation programs on their own land. The movement’s ideals have spread to other parts of India; there is even a plan to increase the extent of protected forests to cover 5 percent of the country.

## Controlling the floods

One of the greatest challenges is the control of the river waters that annually inundate the floodplains. The problem is



**Harvesting rainwater** in the Thar Desert, northwestern India, where rain falls for only about eight days each year during the monsoon. Runoff is stored behind earth dams built across valleys. After the water has soaked into the earth, farmers can grow crops in the damp, silt-rich soil that is left behind.





**Keeping pollution in check** A local urban monitoring station in India at which exhaust emissions are checked for high levels of pollutants. With all the other problems in the region, resources can still be found to implement measures that have only recently been adopted by the more affluent countries of the world

animal protein for most Bangladeshis.

Protecting the embankments from being breached would also be an impossible task. For example, in 1991 floods and cyclones tore down 430 km (260 mi) of earth embankments – built to protect coastal paddyfields from seawater incursion – drowning over 13,000 people and injuring half a million.

#### Conservation and pollution prevention

Although many of the techniques needed to solve the subcontinent's pollution problems are well known, the ability of developing countries to pay for such solutions is the major barrier to their implementation. However, efforts have been made to tackle the problems. Pakistan, for example, has embarked on a National Conservation Strategy, aided by the World Conservation Union (IUCN). The long process will ultimately provide a legislative and advisory framework to tackle the country's most pressing environmental needs.

Adequate drainage, the key to preventing salinization, has already been provided at Pakistan's historical site of Mohenjo-Daro. A ring of wells has been sunk around the site, and pumping is lowering the groundwater level to prevent salt water from penetrating and destroying the ancient bricks. Similar measures to reclaim salinized irrigation land have been put into effect with limited success in the north Indian states of Haryana, Punjab and Uttar Pradesh.

The dangers to health from overusing pesticides can be controlled by integrated pest management. This technique was used in India's northeastern Orissa state in the early 1970s, when the gall midge and other pests were severely damaging many rice crops. The strategy was three-pronged: early maturing, pest-resistant rice was introduced, enabling the harvest to be gathered before the pests were at their most prolific; pests were monitored to determine when their infestation was about to cause damage to the crops; and, perhaps most importantly, pesticides were not applied when the pests' natural enemies – parasites and animal predators – were most abundant.

#### SELF-HELP IN KERALA

In India the nongovernmental Council for the Advancement of Rural Technology has shown how local self-help schemes, using appropriate "intermediate technology", can help in the fight against environmental degradation. One such project was conducted in the Attapady Tribal Development Area, a 765 sq km (295 sq mi) zone in the southwestern state of Kerala that had been heavily deforested, overgrazed and over-cultivated by a rapidly growing population.

In order to reclaim the land, local people were urged to carry out soil conservation measures and reforestation. They reclaimed severely gullied slopes by digging pits, and building earth embankments and small filter dams. These reduce runoff, trap sediment normally carried away by the rains, and improve soil moisture in dry seasons. Indigenous trees have also been replanted, with a 70 percent survival rate. In addition, the Council has introduced new fuel efficient stoves to reduce the pressure of fuelwood collection. The success of the project can be attributed to two factors: the involvement of local people, and the guarantee that they will directly benefit from the improvements.

most severe in Bangladesh, where water brought down from the Himalayas by the Brahmaputra, Ganges, Meghna and some 250 smaller rivers is vital for growing rice: silt brought down by the rivers is crucial to the land's fertility. Heavy flooding, however, caused by monsoon rains in the mountains, brings widespread death and destruction. In 1988, Bangladesh suffered its worst-ever floods, when 80 percent of the country was inundated, killing at least 1,500 people by drowning and snakebite, and leaving 30 million homeless.

The disaster prompted several flood control studies, of which the costliest and most dramatic was put forward by a team of French engineers. Their plan was to construct, over the next 20 years, 4,000 km (2,500 mi) of embankments, averaging 4.5 m (15 ft) high, along the great rivers of the Bangladesh delta. The cost is estimated at \$10 billion. Critics say the scheme relies too much on heavy engineering, while the technical difficulties would be enormous – the combined discharge of the Ganges and Brahmaputra is two-and-a-half times that of the Mississippi in the United States. Such embankments would also prevent fish, which breed in the rivers, from moving into the flooded paddyfields where they are caught for food; they provide the main source of



# A Himalayan controversy

Once the last few decades, academics, foreign aid agencies and politicians have increasingly blamed deforestation of the Himalayas as the chief cause of the ever more frequent flooding of northern India and Bangladesh. According to their argument, the rapid growth of mountain-dwelling populations in India and Nepal since the 1950s has set in motion a chain reaction of environmental destruction.

Growing subsistence societies have accelerated the rate of forest clearance for fuelwood, and overgrazed their herds on the fragile mountain slopes. Once the protective vegetation cover that binds the soil has been removed, the downpours of the monsoon season quickly erode the soil, causing severe gulying and landslides. This in turn disrupts the hydrological cycle: more and more water runs down the mountains into the rivers, which flow down to flood the plains.

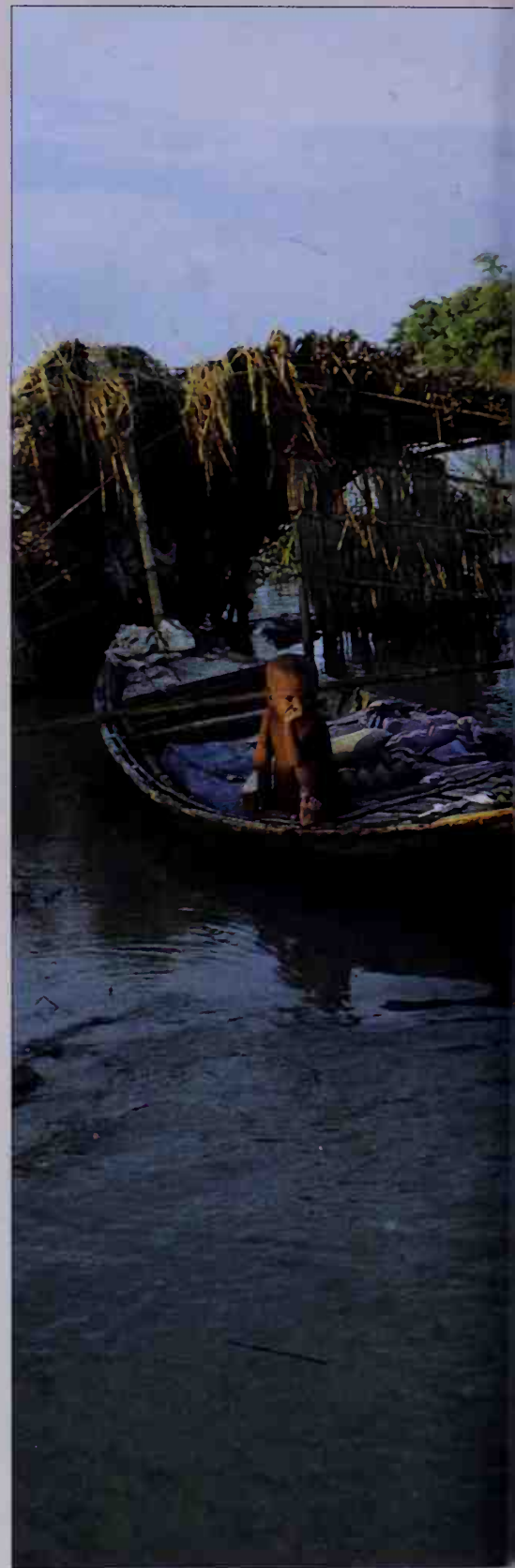
The rivers not only carry excess water, but also soil vital to the Himalayan people. Downstream on the plains, the massive increase in sediment clogs up irrigation channels and reservoirs used in hydroelectric generation, reducing their efficiency and useful lifespan. In the mountains the scarcity of firewood forces people to use dung as their main fuel, depriving terraced farmland of a vital fertilizer – another factor that weakens the soil and encourages erosion.

## New research

This conventional theory about the cause of flooding has, however, been challenged by research being carried out with the support of several organizations in the Himalayan area, such as the United Nations University Project in Nepal and the International Centre for Integrated Mountain Development in Kathmandu (Nepal). Researchers have found little reliable data to support the idea that changes made to the land in the mountains directly affects the Ganges and Brahmaputra, and hence the plains through which they flow. They found even less evidence to back up the claims that the Himalayas have suffered from serious deforestation in recent decades.

In Nepal, for example, forests in the most densely populated area, the middle range of mountains, had been cleared by 1930 and converted to farmland; photographs claiming to show forest loss on some slopes have proved to be wrong; and it has been discovered that, because farmers look after their terraces, there are, ironically, fewer – not more – landslides in areas where the population is highest. So long as terraces are maintained, they in fact conserve the soil more effectively than forest cover.

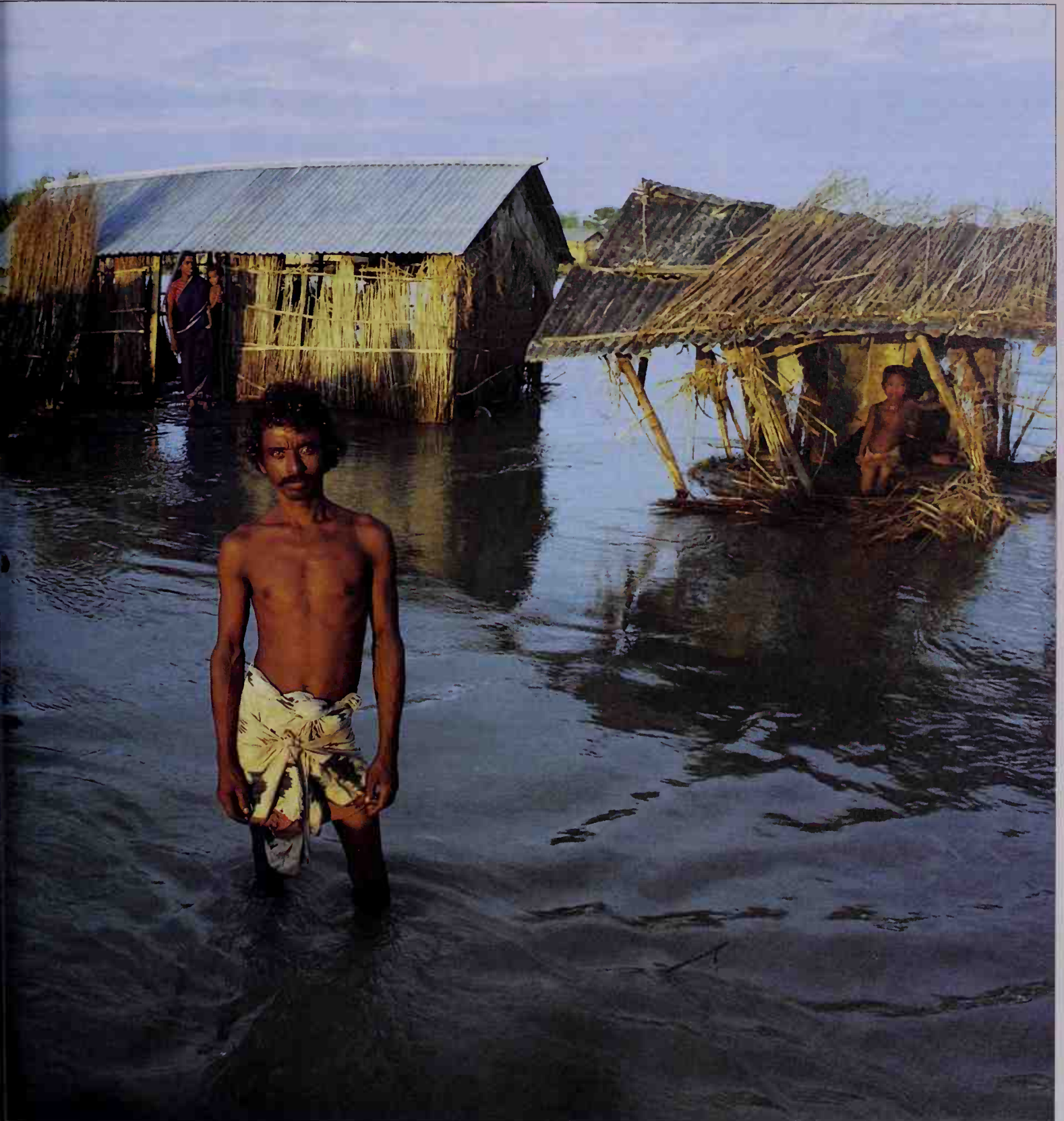
While there is no doubting the appalling nature of the 1988 Bangladesh floods and similar catastrophes, it seems that the



**Flooded out family** (above) As here in 1989, the people of Bangladesh are accustomed to normal flooding after monsoon rains, but disastrous floods have increased in the past 40 years to about one every four years. The 1988 flood left 30 million homeless

**Cause or control?** (left) One theory claims that increased clearance of the Himalayan forests to create terraced farmland, such as this in Nepal, has been the cause of the Bangladesh floods, but recent research indicates that well-managed terraces mitigate floods





interplay between people and their environment may be much more complex than at first thought. Alternatively, the flooding may simply be due to exceptionally heavy rains on the plains themselves, rather than to land-use changes in the mountains. Or to the fact that the Himalayas, being a relatively young mountain chain, are readily eroded by torrential

rains and landslides triggered by seismic activity. Identifying the real causes is of great importance, because if the wrong ones are targeted the remedial action will not necessarily work, and may even create as many problems as those it was intending to solve.

However, even more important than identifying the causes is the need to

relieve the suffering of the people affected by the disasters. Until people living along the cyclone-swept coastline are provided with, among other things, raised homes, schools and roads, high-ground shelters, boats for escape or supplies and embankments to protect coasts, cities and farms, they will remain vulnerable to the unpredictable power of nature.



# GLOSSARY

**Acid rain** Rain or any other form of PRECIPITATION that has become more acid by absorbing waste gases (for example, sulfur dioxide and nitrogen oxides) discharged into the ATMOSPHERE.

**Acid soil** Soil that has a pH of less than 7; it is often PEATY.

**Added value** A higher price fetched by an article or RESOURCE after it has been processed. For example, crude oil has added value when it has been refined.

**Agricultural economy** An economy where most people work as cultivators or PASTORALISTS.

**AIDS**, Acquired Immune Deficiency Syndrome, a disease that damages the body's natural immune system and therefore makes people more susceptible to disease. The Human Immunodeficiency Virus (HIV) is the name given to one of the viruses that can lead to AIDS.

**Air pollution** The presence of gases and suspended particles in the air in high enough concentrations to harm humans, other animals, vegetation or materials. Such pollutants are introduced into the atmosphere principally as a result of human activity.

**Alkaline soil** Soil that has a pH of more than 7; chalk or limestone soils.

**Alpine** (1) A treeless ENVIRONMENT found on a mountain above the tree line but beneath the limit of permanent snow. (2) A plant that is adapted to grow in the TUNDRA-like environment of mountain areas.

**Amphibian** An animal that lives on land but whose life cycle requires some time to be spent in water, eg the frog.

**Apartheid** A way of organizing society to keep different racial groups apart. Introduced in South Africa by the National Party after 1948 as a means of ensuring continued white political dominance, it is now being dismantled.

**Aquifer** An underground layer of permeable rock, sand or gravel that absorbs and holds GROUNDWATER.

**Arctic** The northern POLAR region. In biological terms it also refers to the northern region of the globe where the mean temperature of the warmest month does not exceed 10°C (50°F). Its southern boundary roughly follows the northern tree line.

**Arid** (of the climate) Dry and usually hot. Arid areas generally have less than 250 mm (10 inches) of rain a year. Rainfall is intermittent and quickly evaporates or sinks into the ground. Little moisture remains in the soil, so plant life is sparse.

**Atmosphere** The gaseous layer surrounding the Earth. It consists of nitrogen (78 percent), oxygen (21 percent), argon (1 percent), tiny amounts of carbon dioxide, neon, ozone, hydrogen and krypton, and varying amounts of water vapor.

**Atoll** A circular chain of CORAL reefs enclosing a lagoon. Atolls form as coral reefs fringing a volcanic island; as sea levels rise or the island sinks a lagoon is formed.

**Autonomy** The condition of being self-governing, usually granted to a subdivision of a larger STATE or to a territory belonging to it.

**Balance of payments** A statement of a country's transactions with all other countries over a given period.

**Balance of power** A theory of political stability that is based upon an even distribution of power among the leading STATES.

**Basalt** A fine-grained IGNEOUS ROCK. It has a dark color and contains little silica. Ninety percent of lavas are basaltic.

**Bible** The book of scriptures of CHRISTIANITY and JUDAISM. The Jewish Bible contains many books in common with the Christian version describing

historical events and prophetic teachings, but the latter also includes accounts of the life and teachings of Jesus Christ.

**Biodegradable** (of a substance) easily broken down into simpler substances by bacteria or other decomposers. Products made of organic materials such as paper, woollens, leather and wood are biodegradable; many plastics are not.

**Biodiversity** The number of different species of plants and animals found in a given area. In general, the greater the number of species, the more stable and robust the ECOSYSTEM is.

**Biomass** The total mass of all the living organisms in a defined area or ECOSYSTEM.

**Biosphere** The thin layer of the Earth that contains all living organisms and the ENVIRONMENT that supports them.

**Biotechnology** Technology applied to biological processes, including genetic engineering, the manipulation of the genetic makeup of living organisms.

**Birthrate** The number of births expressed as a proportion of a population. Usually given as the annual number of live births per 1,000 population (also known as the crude birthrate).

**Black economy** The sector of the economy that avoids paying tax.

**Bloc** A group of countries closely bound by economic and/or political ties.

**Boreal** Typical of the northern climates lying between the ARCTIC and latitude 50°N, characterized by long cold winters and short summers. Vegetation in these regions is dominated by BOREAL FOREST.

**Boreal forest** The name given to the CONIFEROUS FORESTS or TAIGA of the northern hemisphere.

**Brown coal** A peat-like material, also known as lignite, which is an immature form of coal. It has a lower energy value than more mature forms of coal.

**Buddhism** A religion founded in the 6th and 5th centuries BC and based on the teachings of Siddhartha Gautama; it is widely observed in southern and Southeast Asia.

**Bureaucracy** The body of STATE officials that carry out the day-to-day running of government. It may also refer to a system of administration marked by the inflexible application of rules.

**Capital** Various refers to machinery, investment funds or a particular employment relationship involving waged labor.

**Capitalism** A political and economic system based on the production of goods and services for profitable exchange in which labor itself is bought and sold for wages. Capitalist economies can be more or less regulated by governments. In a capitalist mixed economy the government will own some of the country's utilities and industries as nationalized companies. It will also act as a major employer of labor.

**Cash crop** A crop grown for sale rather than for SUBSISTENCE.

**Caste** (1) (among people) A system of rigid hereditary social divisions, normally associated with the Hindu caste system in India, where an individual is born into the caste of his or her parents, must marry within it, and cannot leave it. (2) (among insects) A system within a single colony where there are different types of functional individual, usually distinguished by morphology, age and/or sex. For example, queens, workers and drones are distinct castes within a beehive.

**Caucasian** (1) A racial classification based on white or light skin color. (2) An inhabitant of the Caucasus region or the Indo-European language of this people.

**Cereal** A cultivated grass that has been selectively

bred to produce high yields of edible grain for consumption by humans and livestock. The most important are wheat (*Triticum*), rice (*Oryza sativa*) and maize (*Zea mays*).

**CFCs** (chlorofluorocarbons) Organic compounds made up of atoms of carbon, chlorine and fluorine. Gaseous CFCs used as aerosol propellants, refrigerant gases and solvent cleaners are known to cause depletion of the OZONE LAYER.

**Christianity** A religion based on the teachings of Jesus Christ and originating in the 1st century AD from JUDAISM. Its main beliefs are found in the BIBLE and it is now the world's most widespread religion, divided into a number of churches and sects, including Roman Catholicism, Protestantism and Orthodox churches.

**CITES** (Convention on International Trade in Endangered Species) An international agreement signed by over 90 countries since 1973. SPECIES (FAUNA and FLORA) placed in Appendix I of CITES are considered to be in danger of EXTINCTION, and trade is prohibited without an export permit. Signatory countries have to supply data to the World Conservation Union, which monitors IMPORTS and EXPORTS. Appendix II species could be threatened with extinction if trade is not regulated.

**City-state** An independent STATE consisting of a single city and the surrounding countryside needed to support it. Singapore is an example of a modern city-state.

**Class** (1) A group of people sharing a common economic position, for example large landowners, waged-laborers or owners of small businesses. (2) (in zoology and botany) A rank in the taxonomic hierarchy coming between phylum and order. See CLASSIFICATION.

**Classification** A system of arranging the different types of living organisms according to the degree of similarity of their inherited characteristics. The classification system enables organisms to be identified and may also reveal the relationships between different groups. The internationally accepted classification hierarchy groups organisms first into divisions, then phyla, CLASSES, orders, FAMILIES, GENERA, SPECIES and SUBSPECIES.

**Cocoa** One of the ingredients of chocolate, cocoa is derived from cocoa beans, which are the seeds of the cacao tree (*Theobroma cacao*). They are found in yellowish pods that grow directly from the trunk. The tree is native to tropical America, but is cultivated mainly in west Africa.

**Collectivization** The organization of an economy (typically communist) by collective control through agencies of the state. See COMMUNISM.

**Colonialism** The political practice whereby a foreign country is occupied for settlement and economic exploitation.

**Colony** (1) A territory under the sovereignty of a foreign power. (2) (in zoology) A group of individual animals or plants that are physiologically connected to each other. (3) A distinct localized population of animals, for example termites, seabirds etc.

**COMECON** The Council for Mutual Economic Assistance, formed in 1947 as an organization to further trade and economic cooperation between communist countries. It had 10 members before its collapse in 1989 – the Soviet Union, Bulgaria, Czechoslovakia, Hungary, Poland, Romania, East Germany, Mongolia, Cuba, and Vietnam.

**Commonwealth** A loose association of STATES that are former members of the British EMPIRE with the British monarch at its head.

**Communism** A social and economic system based on the communal ownership of property. It usually refers to the state-controlled social and economic systems in the former Soviet Union and Soviet-bloc countries and in the People's Republic of China. See SOCIALISM.



**Coniferous forest** A forest of mainly coniferous, or cone-bearing trees, frequently with evergreen needle-shaped leaves and found principally in the TEMPERATE ZONES and BOREAL regions. The timber they produce is known as **SOFTWOOD**.

**Conservation** The use, management and protection of **NATURAL RESOURCES** so that they are not degraded, depleted or wasted and in order to maintain their sustainable use and ecological diversity. See **SUSTAINABILITY**.

**Constitution** The fundamental statement of laws that defines the way in which a country is governed.

**Consumer goods** Goods that are acquired for immediate use, such as foodstuffs, radios, televisions and washing machines.

**Continental climate** The type of climate associated with the interior of continents. It is characterized by wide daily and seasonal ranges of temperature, especially outside the **TROPICS**, and by low rainfall.

**Continental drift** The theory that today's continents, formed by the breakup of prehistoric supercontinents, have slowly drifted to their present positions. The theory was first proposed by Alfred Wegener in 1912.

**Continental shelf** An extension of a continent, forming a shallow, sloping shelf covered by sea.

**Convention on International Trade in Endangered Species.** See **CITES**.

**Coral** A group of animals related to sea anemones and living in warm seas. Individuals, called polyps, combine to form a **COLONY**.

**Council for Mutual Economic Assistance** See **COMECON**.

**Culture** (1) The beliefs, customs and social relations of a people. (2) The assumptions that a people makes in interpreting the world around them.

**Cyclone** A center of low atmospheric pressure. Tropical cyclones are known as **HURRICANES** or **typhoons**.

**Dead lake (or Dead river)** An area of water in which dissolved oxygen levels have fallen as a result of acidification, overgrowth of plants, or high levels of pollution to the extent that few or no living things are able to survive.

**Debt** The financial obligations owed by a country to the rest of the world, usually repayable in US dollars. Total external debt includes public, publicly guaranteed, and private long-term debt.

**Deciduous** (of plants, trees, a forest etc) dropping their leaves in the winter or in the dry season.

**Decolonization** The transfer of government from a colonial power to the people of the **COLONY** at the time of political independence.

**Deforestation** The felling of trees and clearing of forested land, which is then converted to other uses.

**Delayed runoff** See **RUNOFF**.

**Delta** A large accumulation of sediment, often fan-shaped, deposited where a river enters the sea or a lake. The flow of the river slows down on entering calmer waters and it is not able to transport the sediment it carries. Often the flow of the river splits into many channels, known as distributaries, creating new routes for the water and its load.

**Democracy** A form of government in which policy is made by the people (direct democracy) or on their behalf (indirect democracy). Indirect democracy usually takes the form of competition among political parties at elections.

**Desert** A very **ARID** area with less than 25 cm (10 in) rainfall a year. In hot deserts the rate of evaporation is greater than the rate of **PRECIPITATION**, and there is little vegetation.

**Desertification** The creation of desert-like conditions usually caused by a combination of overgrazing, soil **EROSION**, prolonged **DROUGHT** and climate change.

**Developed country** Any country characterized by

high standards of living and a sophisticated economy, particularly in comparison to **DEVELOPING COUNTRIES**. A number of indicators can be used to measure a country's wealth and material well-being; for example, the **GROSS NATIONAL PRODUCT**, the **PER CAPITA** consumption of energy, the number of doctors per head of population and the average life expectancy.

**Developing country** Any country that is characterized by low standards of living and a **SUBSISTENCE** economy. Sometimes called **THIRD WORLD** countries, they include most of Africa, Asia and Central and South America.

**Dictator** A leader who concentrates the power of the **STATE** in his or her own hands.

**Divide** see **WATERSHED**.

**Dominant species** The most numerous or prevailing **SPECIES** in a community of plants or animals.

**Dormancy** A period during which the metabolic activity of a plant or animal is reduced to such an extent that it can withstand difficult environmental conditions such as cold or drought.

**Drought** An extended period in which rainfall is substantially lower than average and the water supply is insufficient to meet demand.

**EC** See **EUROPEAN COMMUNITY**.

**Ecology** (1) The study of the interactions of living organisms with each other and with their **ENVIRONMENT**. (2) The study of the structure and functions of nature.

**Ecosystem** A community of plants and animals and the **ENVIRONMENT** in which they live and react with each other.

**Effluent** Any liquid waste discharged into the **ENVIRONMENT** as a byproduct of industry, agriculture or sewage treatment.

**Emission** A substance discharged into the air in the form of gases and suspended particles, from automobile engines and industrial smokestacks, for example.

**Empire** (1) A political organization of **STATES** and territories in which one dominates the rest. (2) The territory that constitutes such a group of states.

**Endangered species** A **SPECIES** whose population has dropped to such low levels that its continued survival is insecure.

**Endemic species** A **SPECIES** that is native to one specific area, and is therefore often said to be characteristic of that area.

**Environment** (1) The external conditions – climate, geology and other living things – that influence the life of individual organisms or **ECOSYSTEMS**. (2) The surroundings in which all animals and plants live and interact with each other.

**Erosion** The process by which exposed land surfaces are broken down into smaller particles or worn away by water, wind or ice.

**Ethnic group** A group of people sharing a social or cultural identity based on language, religion, customs and/or common descent or kinship.

**European Community (EC)** an alliance of western European nations formed to agree common policies in the areas of trade, aid, agriculture and economics. The six founder members in 1957 were France, West Germany, Belgium, Holland, Luxembourg and Italy. A further three – Britain, Ireland and Denmark – joined in 1973, Greece in 1981 and Spain and Portugal in 1986. East Germany became a member when it was reunited with West Germany in 1990.

**Evolution** The process by which **SPECIES** develop their appearance, form and behavior through the process of **NATURAL SELECTION**, and by which new species or varieties are formed.

**Exotic** (of an animal or plant) Not native to an area but established after being introduced from elsewhere, often for commercial or decorative purposes.

**Exports** Goods and services sold to other countries, bringing in foreign exchange.

**Extinction** The loss of a local population of a particular **SPECIES** or even the entire species. It may be natural or be caused by human activity.

**Family** A taxonomic term for a group of related plants or animals. For example, the family **Felidae** (cat family) includes the lion, the tiger and all the smaller cats. Most families contain several **GENERA**, and families are grouped together into orders. See **CLASSIFICATION**.

**Famine** An acute shortage of food leading to widespread malnutrition and starvation.

**Fault** A fracture or crack in the Earth along which there has been movement of the rock masses.

**Fauna** The general term for the animals that live in a particular region.

**Feudalism** (1) A type of society in which landlords collect dues from the agricultural producers in return for military protection. (2) A hierarchical society of mutual obligations that preceded **CAPITALISM** in Europe.

**First World** A term sometimes used to describe the advanced industrial countries.

**Fjord** A steep-sided inlet formed when a glaciated U-shaped valley is drowned by the sea. See **GLACIATION**.

**Flora** (1) The general term for the plant life of a particular region. (2) A book that lists and describes the plants of a given area.

**Fossil fuel** Any fuel, such as coal, oil and **NATURAL GAS**, formed beneath the Earth's surface under conditions of heat and pressure from organisms that died millions of years ago.

**Free trade** A system of international trade in which goods and services are exchanged without **TARIFFS**, **QUOTAS** or other restrictions.

**GATT** The General Agreement on Tariffs and Trade, a treaty that governs world imports and exports. Its aim is to promote **FREE TRADE**, but at the moment many countries impose **TARIFF** barriers to favor their own industries and agricultural produce.

**GDP** See **GROSS DOMESTIC PRODUCT**.

**Genus** (pl. **genera**) A level of biological **CLASSIFICATION** of organisms in which closely related **SPECIES** are grouped. For example, dogs, wolves, jackals and coyotes are all grouped together in the genus *canis*.

**Ghetto** A slum area in a city that is occupied by an **ETHNIC** minority. The word originally referred to the part of a city in medieval Europe to which Jews were restricted by law.

**Glaciation** (1) The process of **GLACIER** and ice sheet growth. (2) The effect of these on the landscape.

**Glacier** A mass of ice formed by the compaction and freezing of snow and which shows evidence of past or present movement.

**Global warming** The increase in the average temperature of the Earth that is believed to be caused by the **GREENHOUSE EFFECT**.

**GNP** See **GROSS NATIONAL PRODUCT**.

**Greenhouse effect** The effect of certain gases in the **ATMOSPHERE**, such as carbon dioxide and **METHANE**, in absorbing solar heat radiated back from the surface of the Earth and preventing its escape into space. Without these gases the Earth would be too cold for living things, but the burning of **FOSSIL FUELS** for industry and transportation has caused atmospheric levels of these gases to increase, and this is believed to be a cause of **GLOBAL WARMING**.

**Green Revolution** The introduction of high-yielding varieties of seeds (especially rice and wheat) and modern agricultural techniques to increase agricultural production in **DEVELOPING COUNTRIES**. It began in the early 1960s.

**Gross Domestic Product (GDP)** The total value of a country's annual output of goods and services, with allowances being made for depreciation. Growth in GDP is usually expressed in constant prices, to offset the effects of inflation. GDP is a



very useful guide to the level of economic activity in a country.

**Gross National Product (GNP)** A country's GROSS DOMESTIC PRODUCT plus income from abroad.

**Groundwater** Water that has percolated into the ground from the Earth's surface, filling pores, cracks and fissures. An impermeable layer of rock prevents it from moving deeper so that the lower levels become saturated. The upper limit of saturation is known as the WATER TABLE.

**Growing season** The period of the year when the average temperature is high enough for plants to grow. It is longest at low latitudes and altitudes. Most plants can grow when the temperature exceeds 5°C (42°F).

**Habitat** The external ENVIRONMENT to which an animal or plant is adapted and in which it prefers to live, usually defined in terms of vegetation, climate or altitude – eg grassland habitat.

**Hard currency** A currency used by international traders because they think it is safe from devaluation.

**Hardwood** Any timber from broadleaf trees such as oak, ash and beech. Hardwoods are generally stronger and less likely to rot than wood from cone-bearing trees, which is known as SOFTWOOD.

**Hinduism** A body of religious practices, originating in India in the 2nd millennium BC, that emphasizes ways of living rather than ways of thought. Its beliefs and practices are based on the Vedas and other scriptures and are closely intertwined with the culture of the people of India.

**HIV** (Human Immunodeficiency Virus) See AIDS.

**Hunter-gatherers** People who obtain their food requirements by hunting wild animals and gathering the berries and fruits from wild plants.

**Hurricane** A tropical CYCLONE, usually found in the Caribbean and western North Atlantic.

**Hybrid** An animal or plant that is the offspring of two genetically different individuals. Hybrid crops are often grown because they give higher yields and are more resistant to disease.

**Ice age** A long period of geological time in which the temperature of the Earth falls and snow and ice sheets are present throughout the year in mid and high latitudes. There have been many ice ages in the Earth's history.

**Igneous rock** Rock formed when magma (molten material within the Earth's crust) cools and solidifies.

**Imperialism** The process whereby one country forces its rule on another country, frequently in order to establish an EMPIRE.

**Imports** Goods and services purchased from other countries.

**Import substitution industry** Any industry that has been set up (mainly in THIRD WORLD countries) to manufacture products that used to be imported. Import substitution industries are normally simple ones with an immediate local market such as the manufacture of cigarettes, soap and textiles. They are protected during their start-up phase by high TARIFFS on foreign rivals.

**Indigenous peoples** The original inhabitants of a region, generally leading a traditional way of life.

**Islam** A religion based on the revelations of God to the prophet Muhammed in the 7th century AD, which are contained in the Qu'ran. Islam is widely practiced throughout North Africa, the Indian Subcontinent, the Middle East and parts of Southeast Asia.

**Judaism** A religion founded in 2000 BC among the ancient Hebrews and practiced by Jews; it is monotheistic (believing in a single God) and its main beliefs are contained in the BIBLE.

**Jute** (*Corchorus capsularis* or *C. olitorius*) A fiber crop cultivated in Asia, used to make ropes, sacks, hessian, carpet backing and tarpaulin.

**Labor force** The economically active population,

including the armed forces and the unemployed. Full-time homemakers and unpaid caregivers are not included.

**Leaching** The process by which water washes nutrients and minerals downward from one layer of soil to another, or into streams.

**Left-wing** A general term to denote antiestablishment political views, specifically used as a label for socialist or communist parties. See COMMUNISM, SOCIALISM.

**Legislature** The branch of government responsible for enacting laws.

**Limestone** A sedimentary rock formed under the sea and consisting mainly of calcium carbonate. It is used as a building stone and in the manufacture of cement.

**Literacy** Usually defined as the ability to read and write a simple sentence.

**Low income economy** The poorest countries in the world, where the average PER CAPITA income was between \$610 and \$2,565 in 1990.

**Mammal** A vertebrate animal belonging to the CLASS Mammalia, having a four-chambered heart, fur or hair, and feeding its young on milk secreted by the mammae (nipples). With the exception of monotremes, mammals do not lay eggs, but give birth to live young.

**Mangrove** A dense forest of shrubs and trees growing on tidal coastal mudflats and estuaries throughout the tropics.

**Maquis** The typical vegetation of the Mediterranean coast, consisting of aromatic shrubs, laurel, myrtle, rock rose, broom and small trees such as olive, fig and holm oak.

**Maritime climate** A generally moist climate, determined mainly by proximity to the sea. The sea heats up and cools down more slowly than the land, reducing variations in temperature so that the local climate is more equable than farther inland.

**Market economy** An economy in which most economic activities are transacted by private individuals and firms in largely unregulated markets.

**Marxism** The system of thought derived from the 19th-century political theorist Karl Marx, in which politics is interpreted as a struggle between economic CLASSES. It promotes communal ownership of property when it is practiced, so is popularly known as COMMUNISM.

**Mediterranean climate** Any climate similar to that of the Mediterranean region: wet winters and hot, dry summers.

**Methane** A gas produced by decomposing organic matter that burns without releasing pollutants and can be used as an energy source. Excessive methane production from vast amounts of animal manure is believed to contribute to the GREENHOUSE EFFECT.

**Migrant workers** Part of the LABOR FORCE which has come from another country, or another part of the same country, looking for temporary employment.

**Monetarism** An economic philosophy that sees inflation as the main menace to economic growth and proposes a direct relationship between the rate of growth of the money supply of a country and its subsequent rate of inflation.

**Monsoon** (1) The wind systems in the TROPICS that reverse their direction according to the seasons; when they blow onshore they bring heavy rainfall. (2) The rain caused by these winds.

**Montane** The zone at middle altitudes on the slopes of mountains, below the ALPINE zone.

**Nation** A community that believes it consists of a single people, based upon historical and cultural criteria and sharing a common territory. Sometimes used interchangeably with STATE.

**Nationalism** An ideology that assumes all NATIONS should have their own STATE, a NATION-STATE, in their own territory, the national homeland.

**Nation-State** A STATE in which the inhabitants all belong to one NATION. Most states claim to be nation-states; in practice almost all of them include minority groups.

**Natural gas** A FOSSIL FUEL in the form of a flammable gas that occurs naturally in the Earth. It is often found in association with deposits of petroleum.

**Natural resources** RESOURCES created by the Earth's natural processes including mineral deposits, FOSSIL FUELS, soil, air, water, plants and animals. Most natural resources are harvested by people for use in agriculture, industry and economic activities.

**Natural selection** The process by which organisms not well suited to their ENVIRONMENT are eliminated by predation, parasitism, competition, etc, and those that are well suited survive to breed and pass on their genes to the next generation.

**Nomad** A member of a (usually pastoral) people that moves seasonally from one place to another in search of food, water or pasture for their animals. See PASTORALIST.

**Nonrenewable resource** A NATURAL RESOURCE that is present in the Earth's makeup in finite amounts (coal, oil etc) and cannot be replaced once reserves are exhausted.

**OECD** (Organization for Economic Cooperation and Development) An organization set up in 1961 to promote the economic growth of its (now 24) rich member countries.

**One-party system** A political system in which there is no competition to the government PARTY at elections (eg communist and military regimes) and all but the government party is banned.

**OPEC** The Organization of Petroleum Exporting Countries, a cartel that represents the interests of 11 of the chief petroleum exporting countries. It is able to exercise a degree of control over the price of their product.

**Ozone layer** A band of enriched oxygen or ozone found in the upper ATMOSPHERE. It absorbs harmful ultraviolet radiation from the Sun. The heat this creates provides a cap for the earth's weather systems.

**Pangea** The supercontinent that was composed of all the present-day continents and therefore included both Gondwanaland and Laurasia. It existed between 250 and 200 million years ago. See also CONTINENTAL DRIFT.

**Parasite** An organism that lives on or in another organism of a different SPECIES and derives nutrients from it, giving nothing beneficial in return.

**Parliamentary democracy** A political system in which the LEGISLATURE (parliament) is elected by all the adult members of the population and the government is formed by the PARTY that commands a majority in the parliament.

**Party** An organized group seeking political power to implement an agreed set of policies.

**Pastoralist** A person following a way of life based on tending herds of animals such as sheep, cattle, goats or camels; often NOMADIC, it involves moving the herds according to the natural availability of pasture and water.

**Peat** Soil formed by an accumulation of plant material incompletely decomposed due to low temperature and lack of oxygen, usually as a result of WATERLOGGING.

**Per capita** Per head.

**Permafrost** Soil and rock that remains permanently frozen, typically in the POLAR REGIONS. A layer of soil at the surface may melt in summer, but the water that is released is unable to drain away through the frozen subsoil and refreezes in colder conditions.

**Pesticide** Any chemical substance used to control the pests that can damage crops, such as insects and rodents. Often used as a general term for herbicides, insecticides and fungicides.



**pH** A measurement on the scale 0–14 of the acidity or alkalinity of a substance.

**Plateau** A large area of level, elevated land. When bordered by steep slopes it is called a tableland.

**Polar regions** The regions that lie within the lines of latitude known as the ARCTIC and Antarctic circles, respectively 66°32' north and south of the Equator. At this latitude the sun does not set in midsummer nor rise in midwinter.

**Polder** An area of level land at or below sea level obtained by land reclamation. It is normally used for agriculture.

**Poverty line** A measure of deprivation that varies from country to country. In LOW-INCOME ECONOMIES the poverty referred to is an absolute poverty, where a certain percentage of the population lacks sufficient food to eat and resources to provide for shelter. In the advanced industrial world people are often considered to be in poverty if they earn less than 60 percent of the average wage. Their basic needs will be met by local welfare systems but they suffer poverty relative to their compatriots.

**Prairie** The flat grassland in the interior of North America between 30°N and 55°N, much of which has been plowed and is used to grow cereal crops.

**Precipitation** Moisture that reaches the Earth from the ATMOSPHERE, including mist, dew, rain, sleet, snow and hail.

**Predator** An animal that feeds on another animal (the PREY).

**President** A head of state, elected in some countries directly by the voters and in others by members of the LEGISLATURE. In some political systems the president is chief executive, in others the office is largely ceremonial.

**Prey** An animal that a PREDATOR hunts and kills for food.

**Productivity** (1) A measure of economic output in relation to the quantity of economic inputs (labor, machines, land, etc) needed for production. (2) The amount of weight (or energy) gained by an individual, a SPECIES or an ECOSYSTEM per unit of area per unit of time.

**Quota** A limit imposed on the amount of a product that can be imported in a given time.

**Radioactivity** The emission of alpha-, beta- and gamma particles from atomic nuclei. This is greatest when the atom is split, as in a nuclear reactor. Prolonged exposure to radioactive material can cause damage to living tissue, leading to cancers and ultimately death.

**Rainforest** Forest where there is abundant rainfall all year round and no dry season. The term is often associated with tropical rainforests, where growth is lush and very rapid, but there are also rainforests in TEMPERATE ZONES. Rainforests probably contain half of all the Earth's plant and animal species.

**Refuge** A place where a SPECIES of plant or animal has survived after formerly occupying a much larger area. For example, mountain tops are refuges for ARCTIC species left behind as the GLACIERS retreated at the end of the last ICE AGE.

**Resource** Any material, source of information or skill that is of economic value to industry and business.

**Roman empire** An EMPIRE founded in the year 27 BC from the Roman Republic, which began about 500 BC in present-day Italy. At its height it controlled the Mediterranean, large parts of western Europe and the Middle East. In the 5th century it divided, the eastern half becoming the Byzantine empire.

**Runoff** Water produced by rainfall or melting snow that flows across the land surface into streams and rivers. Delayed runoff is water that soaks into the ground and later emerges on the surface as springs.

**Salinization** The accumulation of soluble salts near or at the surface of soil, caused by an arid climate. Salinization can also occur when water used for

irrigation evaporates; eventually the land becomes so salty that it is worthless for cultivation.

**Savanna** A HABITAT of open grassland with scattered trees in tropical and subtropical areas. There is a marked dry season and too little rain to support large areas of forest.

**Second World** A term sometimes used to describe the developed socialist countries (including the former Soviet Union and former Soviet bloc).

**Semi-arid land** Any area between an ARID desert and a more fertile region where there is sufficient moisture to support a little more vegetation than can survive in the DESERT. Also called semidesert.

**Separatism** A political movement in a STATE that supports the secession of a particular minority group, within a defined territory, from that state.

**Service industries** Industries that supply services to customers or to other sectors of the economy; typically banking, transport, insurance, education, healthcare, retailing and distribution.

**Shanty town** An area of very poor housing consisting of ramshackle huts and other simple dwellings often made from waste materials and with inadequate services.

**Shifting cultivation** A method of farming prevalent in tropical areas in which a piece of land is cleared and cultivated until its fertility is diminished. The farmer then abandons the land, which restores itself naturally.

**Slash-and-burn farming** A method of farming in tropical areas where the vegetation cover is cut and burned to fertilize the land before crops are planted. Often a feature of SHIFTING CULTIVATION.

**Socialism** An economic system and political ideology based upon the principle of equality between people, the redistribution of wealth and property and equal access to benefits such as healthcare and education.

**Softwood** The wood from coniferous trees.

**Solar energy** The radiant energy produced by the Sun that powers all the Earth's natural processes. It can be captured and used to provide domestic heating or converted to produce electrical energy.

**Specialization** (in natural history) The evolutionary development of a SPECIES, leading to narrow limits of tolerance and a restricted role (or niche) in the community.

**Species** The basic unit of CLASSIFICATION of plants and animals. Species are grouped into GENERA and variations may be categorized into SUBSPECIES in descending order of hierarchy.

**State** The primary political unit of the modern world, usually defined by its possession of sovereignty over a territory and its people.

**Steppe** An open grassy plain with few trees or shrubs. Steppe is characterized by low and sporadic rainfall, and experiences wide variations in temperature during the year.

**Subsistence** A term applied to systems in which producers can supply their own needs for food, shelter, etc but have little or no surplus to trade.

**Subspecies** A rank in the CLASSIFICATION of plants and animals between SPECIES and variety. It is often used to denote a geographical variation of a species.

**Subtropical** The climatic zone between the TROPICS and TEMPERATE ZONES. There are marked seasonal changes of temperature but it is never very cold.

**Succession** The development and maturation of an ECOSYSTEM, through changes in the types and abundance of SPECIES. When it reaches maturity it stabilizes in a climax.

**Sustainability** The concept of using the Earth's NATURAL RESOURCES to improve people's lives without diminishing the ability of the Earth to support life today and in the future.

**Tableland** See PLATEAU.

**Taiga** The Russian name given to the CONIFEROUS FOREST and PEATLAND belt that stretches around the world in the northern hemisphere, south of the

TUNDRA and north of the DECIDUOUS forests and grasslands.

**Tariff** A tax imposed on imported goods or services.

**Taxonomy** The scientific CLASSIFICATION of organisms.

**Temperate zone** Any one of the climatic zones in mid latitudes, with a mild climate. They cover areas between the warm TROPICS and cold POLAR REGIONS.

**Terrestrial** (of a plant, animal etc) spending its entire life cycle on the land.

**Third World** A term first used to refer to ex-COLONIES that were neither fully capitalist (FIRST WORLD) nor fully socialist (SECOND WORLD). Now used to refer to the poorer, less industrialized countries of the developing world.

**Tribe** A group of people united by a common language, religion, customs and/or descent and kinship; often used to describe the social groups of peoples who have no developed STATE or government and whose social organization is based on ancestry and extended family systems.

**Tropics** The area of the Earth lying between the Tropic of Cancer (23°30' N) and the Tropic of Capricorn (23°30' S). They mark the lines of latitude farthest from the Equator where the Sun is still found directly overhead at midday in midsummer.

**Tundra** The level, treeless land lying in the very cold northern regions of Europe, Asia and North America, where winters are long and cold and the ground beneath the surface is permanently frozen. See also PERMAFROST.

**Upper-middle-income economy** Any country where average PER CAPITA income was between \$2,566 and \$7,619 in 1990.

**Urbanization** (1) The process by which the proportion of a country's population living in towns or cities grows, while the rural population diminishes. (2) The process of city formation and growth.

**Water table** The uppermost level of underground rock that is permanently saturated with GROUNDWATER.

**Waterlogging** The complete saturation of land by water.

**Watershed** The boundary line dividing two river systems. It is also known as a water-parting or divide, particularly in the United States, where the word watershed refers to a river basin (the area drained by a river and its tributaries).

**Welfare State** A social and economic system based on STATE provision of, and responsibility for, such things as healthcare, pensions and unemployment benefit. These services are financed by general contributions from the working population, and access is intended to be equally available to all, free of charge. It originated in Britain at the start of the 20th century and became widespread in Europe after World War II.

**Wetlands** A HABITAT that is waterlogged all or enough of the time to support vegetation adapted to these conditions.



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